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MANGANESE BRONZE VALVES

INTERESTING APPLICATION OF THIS REMARKABLE ALLOY IN NEW YORK CITY'S NEW WATER SUPPLY.

BY L. J. KROM.

As we have said before when telling of some notable casting or piece of metal work used in the construction of Greater New York's mammoth water supply system, the engineers in charge of the undertaking are building for all time. With this idea foremost in their minds when they were planning the work they cast about to discover the metal that would be the most durable and still conform to the rigid specifications proposed. These specifications are probably the most strenuous that have ever been devised for an engineering proposition. After mature study and deliberation, bronze was chosen for the metal to make the large valves, risers and riser caps with all of their accessory parts and in fact this was the metal proposed to be used in all parts of the system where longevity and safety were demanded and with no regard for first cost. THE METAL INDUSTRY has consistently followed the manufacture and installation of these bronze parts with a great deal of interest. Some articles giving description of the most important metal parts were published in March and October, 1911, June and September, 1913, and February, 1914.

In all it has been estimated that three million pounds of "bronze" of various classes would be required for the entire water system. Judging from the weight of some of the individual castings which have been described, we should say that this estimate is under rather than over the actual amount. "Bronze" is defined by the engineering board as follows: "Whenever the term bronze is used in the specifications in a general way, or on the drawings, without qualification, it shall mean manganese or vanadium bronze or Monel metal. Whenever the characteristics of any material are not particularly specified, such material shall be used as is customary in first class work of the nature for which the material is employed. The minimum physical properties of bronze shall, except as otherwise specified, be as follows:

Castings:

Ultimate tensile strength..65,000 pounds per square inch
Yield point .....32,000 pounds per square inch
Elongation .....25 per cent.

FIG. 1. FORTY-THOUSAND-POUND PARSONS MANGANESE BRONZE VALVE BEING HAULED TO 93RD STREET AND CENTRAL PARK WEST, NEW YORK.

Rolled material, thickness one inch and below:
Ultimate strength.....72,000 pounds per square inch
Yield point .....36,000 pounds per square inch
Elongation .....28 per cent.

Rolled material, thickness above one inch:
Ultimate strength .....70,000 pounds per square inch
Yield point .....35,000 pounds per square inch
Elongation .....28 per cent.

After being forged into a bar, rolled or forged bronze shall stand first, hammering hot to a fine point; second, bending cold through an angle of 120 degrees to a radius equal to the thickness of the bar.

Bronze, Class C and Class D, shall conform to the following requirements:

Class C—Ingredient: copper, 82.8 per cent.; tin, 4.8 per cent.; zinc, 4.4 per cent.; lead, 8 per cent. The variation in percentage of any ingredient shall not exceed 0.75 of one per cent.

Class D—Ingredients: copper, 82.7 per cent.; tin, 7.1 per cent.; zinc, 5.3 per cent.; lead, 4.9 per cent. The variation in percentage of any ingredient shall not exceed 0.75 of one per cent.

All bronze shall be made of new metal, shall be free from objectionable imperfections and shall conform accurately to patterns. When any material is being machined if the metal shows signs of imperfect mixing, it shall be rejected.

Proprietary seamless drawn bronze tubing may be accepted in lieu of manganese or vanadium bronze, or Monel metal tubing, provided it possesses satisfactory chemical properties and the physical properties herein specified. The standard unit weights of materials shall be considered as follows when computing weights are to be paid for.

Manganese bronze .....302 pounds per cubic inch
Vanadium bronze .....302 pounds per cubic inch
Monel metal .....323 pounds per cubic inch
Bronze tubing .....307 pounds per cubic inch

One of the latest castings to be delivered for the water supply system is one of two 66-inch valves designed for use in the city pressure tunnel in New York City. One of these valves will be located at Ninety-third street and Central Park and the other at Twenty-fourth street and Broadway. The purpose of the valves being to divide the tunnel in three parts, any one of which may be cut out at will. This valve is shown in Fig. 1 on the wagon being drawn by ten horses and some idea of its size may be gathered from the fact that its weight is 40,305 pounds and it is 12 feet 4½ inches high. It is really the largest all-bronze valve ever made. A better view of the valve is shown in Fig. 2. The valve with its accompanying expansion joint pipe line was cast most successfully by the Wm. Cramp & Sons Ship and Engine Building Company, Philadelphia, Pa., of their Parsons Manganese Bronze mixture. The production of such enormous castings without a hitch in the foundry operations is indeed a performance worthy of great praise. The preparation of the tremendous body of metal required is in itself a gigantic task, for if the finished valve weighs 40,000 pounds, considerably more than this must be melted to provide for gates and risers, etc. The mold for the valve was another remarkable piece of work. This was made in loam and bricked and bound in Cramp's own reliable fashion. The mold for the valve was made by two men in 26 days, while the mold for the expansion joint took two men 28 days.

The metal used in these castings was prepared as is all Cramp's Parsons Manganese Bronze, in their own foundry to the original Parsons formula. The zinc used in its preparation is also manufactured by the Cramp company and is the same that they use in all of their engineering alloys and which they also supply to their customers.

Fig. 3 shows the expansion pipe line which connects the valves to the tunnel. The cast valve is connected by four sections of bronze pipe, three on one side and one on the other, and two of these form what are known as expansion pipe joints. The extra wide flanges designed for this purpose are easily seen in the photo. It was first

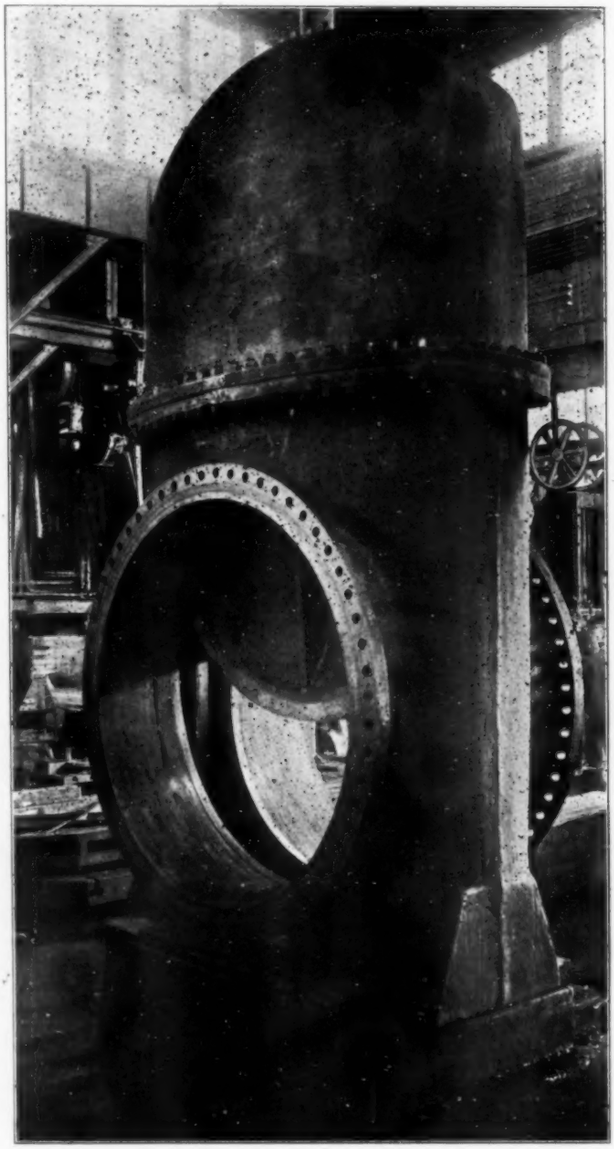


FIG. 2. THE BIG 66-INCH VALVE CAST BY THE CRAMP COMPANY FOR THE NEW YORK CITY BOARD OF WATER SUPPLY.

designed to have the flange joints ground, but this was found to be unpracticable, so two rings or gaskets of Naval bronze were inserted inside the flange and no leaks were detected when the testing pressure of 300 pounds per square inch was put upon the pipe. The four-piece section of bronze pipe as shown in the cut (Fig. 3) is 66 inches in diameter and weighs 30,721 pounds.

Some actual physical tests of this material are as follows:

	Strain Per Square Inch in Lbs.	Limit of Elasticity Per Sq. Inch in Lbs.	Elongation of Orig. Length. Per Cent.	Reduction Original Sec. Per Cent. of
	72,000	33 750	30	26½
Pipe	72,500	34,500	33	35.7
Pipe expansion piece	69,000	33,000	46	47.8
66 inch	69,000	35,500	46	48.6
M. H. pipes	74,000	35,000	39	41.5
66 inch pipe	70,750	34,750	42.5	44.9
Expansion piece No. 2	72,000	33 000	40	38
66 inch valve	71,250	34,000	42	42
66 inch pipe M. H. No. 2	70,000	33,000	43½	46
66 inch valve bonnet	70,500	34 000	45	44.9

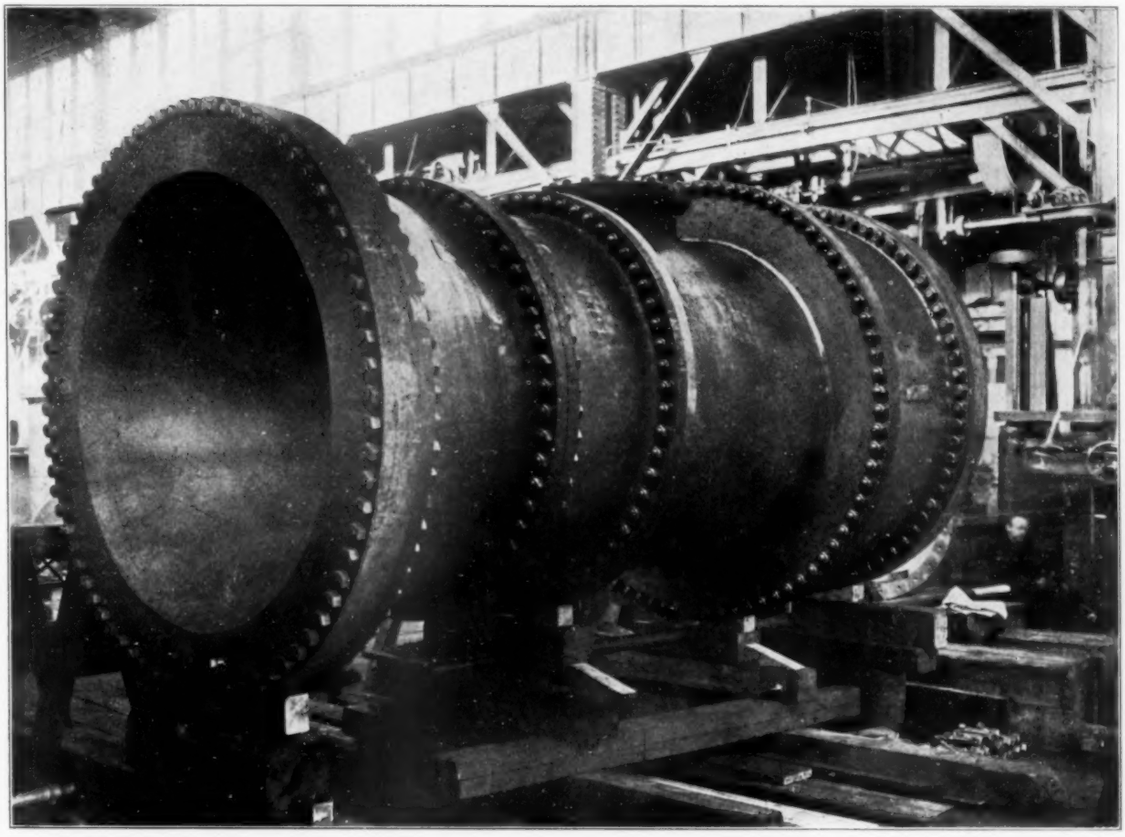


FIG. 3. THE PARSONS MANGANESE BRONZE PIPE LINE CONSTITUTING AN EXPANSION JOINT FOR THE 66-INCH VALVE SHOWN IN FIG. 2.

PLATINUM IMPLEMENTS FOR TECHNICAL PURPOSES

The enormous price to which platinum has risen has made it most desirable to find ways and means to provide implements, and especially receptacles plated with platinum, which will answer the purpose equally as well as pure platinum. To achieve this, it is in the first place necessary for such plated articles that they should stand a high temperature, or rather that the foundation metal should have a high melting point.

The principle on which other metals have hitherto been covered with platinum has been by a primary galvanoplaster copper deposit followed by a platinum deposit by the same means; or the article was electro-plated with a mixture of platinum and an inferior metal. This system is no doubt an excellent one for articles which need not be exposed to a high temperature, but if a heat of say from 900 to 1,000 degrees Centigrade has to be dealt with, other means have to be employed, as at that temperature the platinum coating blisters or comes off in flakes.

The process here described will furnish an article plated with platinum, which will not blister or flake off at this high temperature. The metal chosen as a foundation for the platinum should be of cobalt or nickel, or their alloys. The process is as follows: The article to be plated, say of nickel, is prepared in the usual way for electro-plating and then coated with a deposit of say 75% of nickel and 25% of platinum. A current of 0.6-0.8 Amperes by 4-6 volts is used to the square centimetre, and this will give a deposit strong in nickel and only little platinum. The coating so obtained is now scraped and dried as usual, and the article is then heated in hydrogen to a temperature of 900 to 1,000 degrees Centigrade, which effects a welding-on or fusing together of the covering and its nickel foundation. The contention is that the hydrogen has the effect of entering the surface of the metal at that temperature and thereby, so to speak, loosening its surface, which encourages the fusing together.

A HALF CENTURY WITH THE METAL INDUSTRY

CHARLES F. BROOKER IS TENDERED A DINNER BY THE AMERICAN COPPER PRODUCERS' ASSOCIATION TO CELEBRATE HIS FIFTY YEARS OF SERVICE IN THE METAL BUSINESS.

Charles F. Brooker, one of the predominating figures in the metal industries of the world, a man who has seen service in many lines of human activity and who has won laurels wherever he has served, was recently honored by the Copper Producers' Association to commemorate the completion of half a century of activity. At a dinner served at Sherry's, New York City, Mr. Brooker repaid his hosts by delivering an address which deserves widespread publication, because of its value as an historical narrative of the progress of the copper and brass industry in the Naugatuck valley—the fountainhead, really, of the industry in the western hemisphere.

His innate modesty has prevented the publication of that address, however, except as a brochure for circulation among his friends and no publication has given the text to its readers yet. One portion that suggests the wealth of experience Mr. Brooker has enjoyed in his life work is reproduced here:

When your committee suggested a complimentary dinner to me on the fiftieth anniversary of my entrance into the world of copper, it seemed hardly worth while, but when you urged that during that period the growth of the business had been remarkable enough to call for some gathering of this kind, and that my connection with it was an incident, or an excuse to have an evening of producers, consumers and other friends, for the first time in history, at the same table, I consented.

When we consider the growth of the copper output of the United States from 17,000,000 pounds in 1864, to approximately 1,623,000,000 pounds in 1913, and the increase in the world from 83,000,000 pounds in 1870, to 2,204,000,000 in 1913, and this during the active business life of one who has been, and still is, endeavoring to aid in its progress, it would seem that as producers and consumers we are justified in having a dinner together, to felicitate ourselves on being intimately connected with the output and consumption of an article so essential to the well-being of mankind; leading in both its product and its use, to such an extent as to make our country the determining factor in the article, and because of its commanding position, potent in all financial and commercial operations.

CHARLES F. BROOKER.

Charles Frederick Brooker was born March 4, 1847, in Litchfield, and is a Connecticut Yankee to the bone. His family has its American origin in Guilford, this state, where John Brooker, an Englishman, was located in 1695. Two generations later, Abraham Brooker, Jr., his father, removed to Wolcottville, now Torrington.

Mr. Brooker's schooling in the kingdom of the Three Rs was followed by a course in the brass industry as an employee and he is still following that continuation school, than which there is none with a wider range of studies or a more valuable system for teaching how to keep industry strictly within the realm of the practical. One needs but to ponder a moment on the variety of articles manufactured in brass industries and their nature and uses to realize that this is, of all industries, the one which owes its existence to the likes and dislikes of the housewife, the mechanic, the workingman and working woman in every field of human activity.

From the start Mr. Brooker showed a liking for the business which promised well and at the age of seventeen he became bookkeeper for the Coe Brass Company of Torrington. He became its secretary in 1870. Hon. Lyman W. Coe, who was Mr. Brooker's uncle, devoted his life to the development of that company's business and while the big factories that made brass and other copper products down in Waterbury were growing fast, the Torrington business also was making strides which showed that it could keep pace with the best of them.

Mr. Coe died in 1893 and Mr. Brooker, who had already become familiar, through the necessity of handling many of the details of his office, with his uncle's position succeeded him as president of the Coe Brass Company.

Seven years later five great brass concerns in the Naugatuck Valley were combined and the American Brass Company, with a capital of $12,500,000, came into existence. Mr. Brooker was made president of the new company, which office he still holds, and with the office goes the title of the "largest purchaser and consumer of copper in the world."

Besides being a very busy man as the head of one of the most rapidly growing industries in the world, Mr. Brooker has been a very busy man in every sense of the term and has gained thereby a development which is enviable indeed. His character has been such that he has always been in the forefront of any movement with which he was interested, hence it is not surprising that his accomplishments include among other things, the attainment of positions of power and prestige in political, social and financial circles. In Ansonia and in Torrington he has held many important positions as director of bank, water, and manufacturing companies, and in New Haven and Waterbury, also, his counsel and influence have been welcomed in bank directorates and various organizations which take pride today in having his name on their membership rolls. He was a director of

the New York, New Haven and Hartford Railroad Company for many years. In New York City he is one of the leading members of the Union League Club, of the New England Society of New York, of the New York Chamber of Commerce, the New York Yacht Club, the Engineers' Club, the Lawyers' Club and the Transportation Club. Politics has had much of his attention until recently. He was a member of the general assembly of Connecticut in 1875 and served in it again as a member of the Senate in 1893. He was also one of the prominent members of the republican state central committee of Connecticut for years and a member of the national committee of the Republican party until about a year ago. Mr. Brooker since his marriage to Mrs. Julia E. Clark Farrell in London some years ago has made his home in Ansonia, Conn.

Mr. Brooker has always attributed much of his success in business and manufacturing to the splendid influence of the men with whom he came into close contact when he first entered the rank of the employed. He met many men who have since been recognized as the pioneers of trade and manufacturing development of this country and the lessons he learned from them have proved invaluable. His experience spans the period between the days when a brass mill received seventeen cents a pound, above the cost of the mixture, for brass and brass wire and twenty-two cents a pound for converting copper into wire, and the present, when a mill gets two and a half cents a pound, above the cost of the mixture, for brass and brass wire and about a cent a pound, or less, for wire-drawing. The same period shows quotations for copper wire, in 1864, at seventy-four cents a pound and brass wire at sixty-four cents, while today copper wire sells for sixteen cents, or thereabouts, and brass wire for between fourteen and fifteen.

One portion of Mr. Brooker's address is worthy of prominence in view of the hesitation shown in many branches of industry at the present time. It is quoted below:

"The wave of prosperity may recede for a time, but when the tide turns, as it always has, and always will, it will reach a higher point than ever before, and our history of continuing development will repeat itself."

Mr. Brooker has seen ups and downs enough to be a pretty good judge of business conditions. The above message, which was in the concluding portion of his address to the Copper Producers' Association, should be taken as the expression of a judge who is probably better able to read the signs of the times than most of his contemporaries, for his life, up to the present, has enabled him to study conditions from many angles and has made him the wise and good friend that his associates in business and outside of business know him to be.

[THE METAL INDUSTRY has now chronicled the service of fifty years in the metal industry of three men. The first was T. G. Locker, manager for Charles Clifford and Son, Ltd., Birmingham, England, in May, 1908. The second was C. P. Goss, President of Scovil Manufacturing Company, Waterbury, Conn., in February, 1912.—Ed.]

IRON TANKS AND THEIR USE FOR PLATING PURPOSES

By H. J. Ter Doest.*

As iron tanks make a short path for the current going from the anode to the cathode, they are entirely unfit for plating purposes where a good uniform deposit is required on the work, unless they are lined with a non-conducting material in such a way as to make the path of least resistance from the anode to the cathode. For instance, the way a plating tank is generally arranged the current comes in at the anode, dissolves the metal there, goes over to the tank and deposits metal and then through the tank around to the work that is nearest to the tank, oxidizing the tank where it leaves same. The greatest deposit on the work will be found where it is nearest the tank and less as it is nearer the center of the tank or nearer the path of the greatest resistance. The current in this way has two plating paths in series, one with a soluble anode and the other with an insoluble anode; from positive or anode to neutral or tank (as in a three-wire system), and then from tank to work or negative. As electricity flows in proportion to the resistance it follows, the path of the lowest resistance and the most current flows that way, while some flows direct from anode to cathode.

It will be observed that if you hang a piece of metal in a plating solution while the current is passing and have the said piece of metal in the path of the current, or between the anode and cathode, and suspended by a string or any other non-conducting material, it will plate on the anode end or side, while it will be dissolved or attacked on the cathode end or side, depending on the solubility of the metal in the solution.

Now in basket work this can be taken advantage of by placing an anode on the work in the basket, but insulated from it, and connecting wires to this anode to extend beyond the outside of the basket and well above it. This provides the shortest path for the current which is from the anode to the end of these wires to anode on the basket and to the work in the basket and out. This can be worked out by making the wires longer or shorter so that the work will plate in the middle of the basket faster than on the outside or just as fast according to whether you make the wires longer or shorter and more or less of them. It can also be used to plate the inside of tea pots or sugar bowls or any hollow article, as fast as the outside or faster if necessary.

Another thing this principle might also be used for is the plating of spoons where the heaviest coating is needed on the wearing parts, as the iron current leaders might be so constructed that with one plating it would plate as heavy a deposit as desired and in any particular place. This may be done by simply getting more current to the place where the heavy deposit is required, as the steel would not be affected by the silver solution unless the current density gets too high and not with the ordinary density that is used to do such work.

Now what I said about iron tanks applies only to clean iron tanks. Iron tanks when in use a while, unless there is very much free cyanide in the solution, or do not use it very much and keep it quite clean, the oxidation puts a coat of rust on the tank which partly insulates it on the inside and lessens the trouble considerably. This is also what makes the tanks leak. The corroding effect in the tank is most noticeable in electric cleaners when the tank is used as the anode. The tank soon gets corroded and almost stops the current as far as usefulness goes. For electric cleaning, unless kept clean by scraping and then after being cleaned a few times it begins to leak, so I always use a separate steel anode that can be taken out and cleaned and save the tank.

*Foreman plater, Enterprise Manufacturing Company, Akron, Ohio.

THE USE OF CHEMICAL STONEWARE IN THE METAL INDUSTRY.

A Description of Some Practical Designs for Receptacles for Corrosive Liquids.

By Percy C. Kingsbury.*

If there is any royal road to the profitable operation of manufacturing equipment, it is in taking prompt and full advantage of improvements in modern methods and materials. The handicap of an obsolete or obsolescent plant is so inevitable that the man who thinks he cannot afford to bring his equipment up to date is almost invariably the one who can least afford not to do so.

To use for handling acids and similar liquids of a corrosive nature, materials which are themselves destroyed by the liquid does not on first consideration seem to be in accordance either with good practice or common sense; yet there are thousands of acid tanks in use which, their owners know, will have to be replaced every few months, which are dirty and messy, and which, by developing leaks at any inopportune moment, are a constant menace to employes and property.

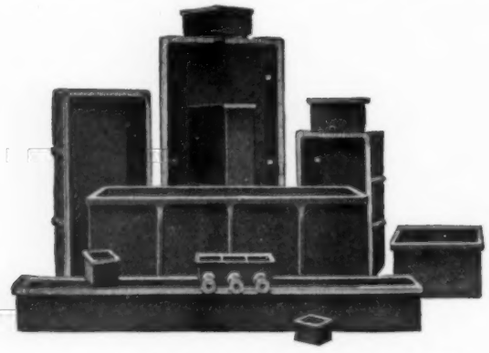


FIG. 1. COLLECTION OF STONEWARE TANKS.

The use of wooden tanks for nitric acid introduces a graver risk. The action of nitric acid on wood is to produce compounds of an extremely inflammable nature and we might look to this source for the explanation of many mysterious fires in buildings containing small photoengraving and plating shops. The desirability for such work of a material unaffected by any of the chemical solutions met with in industrial work under any conditions whatever is very obvious. It is also scarcely necessary to emphasize the advantage for storage batteries and for such purposes as electro-deposition and electro-chemical work, of tanks made from a material with a high electrical resistance.

Of the few products on the market which meet these requirements almost all are limited by the processes of their manufacture to comparatively small dimensions, chemical stoneware alone being available in sizes practicable for large scale operations as distinguished from laboratory experiments.

Until recently a grade of stoneware suitable for such work was only available by importation from the large European manufacturers specializing in this ware and the use of the makeshift materials hitherto employed is without doubt attributable to this fact. This disability is now removed, as a plant exclusively for the production of high grade chemical stoneware, closely associated with the largest of the European manufacturers, has been established in this country, where the processes of manufacture that have proved successful on the other side are being used in so far as they are applicable to American conditions.

It will be admitted that the efficiency of employees, to say nothing of their health, must be impaired if they are obliged constantly to breathe an acid laden atmosphere. At the same time in an installation of acid tanks that cannot be kept clean or in good repair there is no incentive and indeed no object in attempting to render more hygienic the conditions under which the operatives work. An equipment of chemical stoneware tanks offers a distinct inducement to improve these conditions. Such efforts as have been made to obtain efficient ventilation of shops where acid fumes are evolved have usually proved ineffective for a lack of suitable means of mechanical draft. Where metal fans or exhausters are used the acid rusts the bearings or loosens the blades and the apparatus is either constantly out of commission or the continued expense for repairs and replacements soon becomes prohibitive.

FIG. 2. A STONEWARE CASED EXHAUSTER.

To obtain a permanent ventilating system under such conditions the exhauster must itself be permanent. The design of an efficient exhauster of chemical stoneware is no simple matter on account of the high speed, the tensile strength of stoneware being low compared with that of most metals.

A thoroughly practical design has, however, been evolved as the result of careful experiment and thousands of these machines are now in constant use. One type is illustrated in Fig. 2. Here the stoneware casing is exposed. The same machine is also made completely encased in a cast iron jacket.

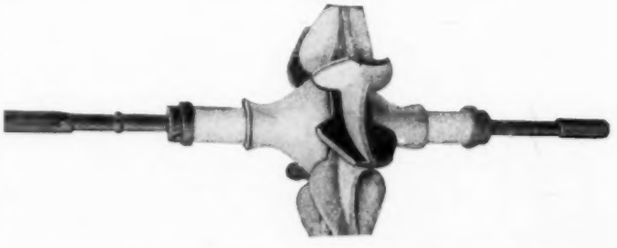


FIG. 3. THE FAN WHEEL OF MACHINE SHOWN IN FIG. 2.

The fan wheel of this machine is shown in Fig. 3. It is entirely of chemical stoneware and is driven by a steel shaft which is protected by stoneware sleeves. Where these sleeves project through the stuffing box of the casing they are accurately ground and afterwards polished to insure smooth operation. Every part of the machine coming in contact with the acid gases is of chemical stoneware and the possibility of corrosion is therefore eliminated. Adequate strength of the moving parts is assured by running the machines at 50 per cent. above their rated speed before they leave the factory.

*Chief Engineer, German-American Stoneware Works, New York.

FIG. 4. A STONEWARE TOWER.

In large installations the expulsion of acid fumes into the air is a frequent source of complaint and litigation. Even in smaller plants these fumes will soon destroy the appearance of metal fittings and fixtures, and on dull days they are frequently the cause of much discomfort. When the plant is located in a residential neighborhood these objectionable features are of course accentuated.

It is a simple matter to render such fumes innocuous by passing them through a wash tower as shown in Fig. 4, over which a small stream of water or dilute alkali is distributed. Where the amount of acid going to waste is sufficient to justify the installation of a more elaborate equipment a large proportion can be recovered as weak acid which can be used over again by revivifying with stronger acid.

There has been installed at the Imperial Exhibition for the welfare of operatives (Ständige Ausstellung für Arbeiterwohlfahrt, Reichsanstalt) in Berlin, Germany, which corresponds to the American Museum of Safety in New York, the working equipment shown in the accompanying illustration, Fig. 5. This installation consists of a number of tanks with suitable means for the removal of noxious fumes by an exhauster which discharges them into a wash tower as described above. Provision is also made for neutralizing the acid waste water and for the recovery of the copper it contains. Every part of this installation coming in contact with acid gas or liquid is of chemical stoneware and is therefore permanent.

The object of this exhibit is to illustrate an ideal equipment and to serve in a practical way as a guide for similar installations on an industrial scale.

The same ideas can be applied with advantage to many plants on this side as there is now no good reason why by making use of the advantages offered by modern chemical stoneware equipment, any process in which volatile acids are employed should not be as healthy as any other manufacturing operation.

SPRAYING WITH MOLTEN METAL.

An article in the Revue de Metallaigie, Paris, France, describes a new device which has been introduced for applying the Schoop process for coating objects with various metals. The machine is called a pistol-syringe. The metal in the form of wire is fed automatically into it, and melted by means of an oxy-hydrogen flame, or a flame where the hydrogen is replaced with illuminating gas. The molten metal is sprayed with compressed air which also works a small turbine that advances the wire. The use of metallic powder is therefore obviated. The details of the construction are given, and several views of it in use.

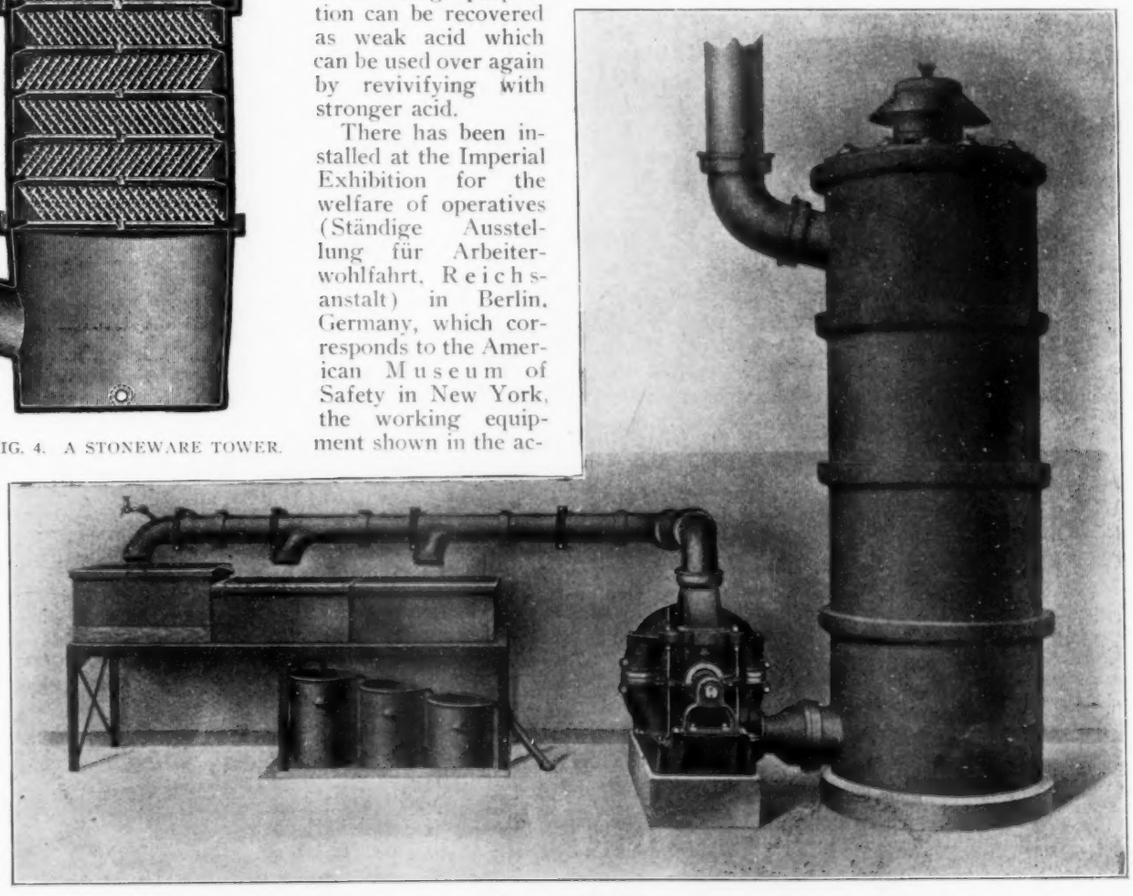


FIG. 5. AN EXHIBITION OF A WORKING INSTALLATION OF CHEMICAL STONEWARE.

HOT PROCESS OF GALVANIZING

Some Practical Suggestions for Successful Coating of Grey Iron With Zinc.

By W. H. Parry.*

The two very valuable articles, "The Protection of Iron from Rust:—Hot Process of Galvanizing" by A. P. Wright and "Tests for Galvanized Products" which you credit to the pamphlet issued by the Meaker Company of Chicago, Ill., prompts me to offer you my most sincere thanks for giving them publicity under one cover in the issue of The Metal Industry for April, 1914. While they are pretty near to the last word in the art of galvanizing, yet there are a few loopholes that seem to give me an opportunity to hand out some additional data, which is hereby offered in a spirit very similar to that shown by the man who was given an expensive gold watch by his best friend as a token of friendship, and which was reciprocated by giving a picture clipped from a newspaper of a Dollar Ingersoll watch in return.

Hot galvanizing is without a doubt the best method of protecting gray iron castings from the formation of rust and, as my experience has been limited entirely to coating gray iron, it must be understood at the outset that whatever is written here relates only to gray iron as the material coated.

In 1907, when sherardizing was first introduced to the long suffering public in this neck of the woods, it was claimed that any ferrous metal coated thusly would be immune from the ravages of oxidation and, like many others, your humble servant fell for it. But after two years of constant experimenting, it was proven beyond doubt that while Sherard Cowper Cowles, the native of Great Britain who invented Sherardizing, had made a great discovery in so far as coating steel, wrought iron and malleable iron was concerned, he had not improved matters where cast gray iron was the material to be coated, as rust would form on sherardized castings made of gray iron about as fast as if they had not been coated at all.

Perhaps my method of testing coatings may be of value to those who want to prove to their own satisfaction that what is written here is true and which, without hesitation and avoiding all technicalities, I will describe thusly: Place the sample in water, just ordinary, every day water, in a depth sufficient to completely cover it; then wait until enough of the water has evaporated to expose some portion of the surface. Repeat this operation by adding more water. Don't throw the old water away, but just add some new water to the old and let old "General Evaporation" get on the job once more. If the coating survives this double dose, "believe me, Mawruss," you will have some coating, but its name won't sound anything like "Sherardizing." The drawback to this test is the waiting; but on the principle of "everything comes to him who waits" it pays in the long run, and as you don't have to use a lot of chemicals with highfalutin names, such as Proboscitate of Slambangdoodleum or Heliotropus Succotash, you won't stain your fingers in the handling.

Having satisfied myself that sherardizing would not fill the bill, I naturally turned to hot galvanizing, and what I did not know about it was plenty. Nevertheless, I made a start, and by stages acquired the necessary knowledge, so that now I can throw an awful bluff at being an authority on the subject, as I feel perfectly safe in assuming this pose because of the colossal amount of ignorance that most people show in their views of how hot galvanizing is accomplished. Hot galvanizing is such a simple process that it is surprising that more concerns do not install their own equipment. More so nowadays when gray iron castings can be cleaned so thoroughly by the use of the sand blast, as clean castings are the sine qua non to successful galvanizing, and anybody that cannot galvanize soft gray iron castings that have been sand blasted, could not start a fire with the aid of a box of matches, a ton of shredded wheat and a bale of hay.

After all the "airy persiflage" so far used by the writer in his attempt to instruct prospective galvanizers, I will now get down to business.

Galvanizing kettles are usually made of "fire box" steel or wrought iron with riveted joints, and, unless purchased from a reliable concern that make a specialty of such tanks, trouble will develop. As all rules applicable to the making and the kind of material used for containers of molten metals do not apply to galvanizing kettles, the fires are so arranged that the heat must enter through the sides and sometimes the ends, but never through the bottom of the kettle, as the formation of dross would be too rapid for the economical results that we are all striving for. Let us assume that you have bought your kettle. The next step is to build a brick wall around it with spaces provided for the side fires, openings at the sides for the dampers, ash pits and bearing bars, for the grate bars set in place and covers for the top of the fires which can be made of cast iron. This is the usual method of "rigging up" a kettle, and you will find it a rather expensive one, not only in its initial cost, but for maintenance, and the "crux of the whole geschaft," is the cost of maintenance. Not so much while the kettle is in actual operation as when it is dormant in the stilly night, for unless you have a night, yes and a day watchman for Sundays and holidays, you had better keep out of the galvanizing business. It is then that most of the damage is done to both the kettle and the tons of spelter it contains, and unless great care is exercised, the formation of dross will be so rapid that you will curse the day and the man who was responsible for your start as a galvanizer.

The melting point of spelter is about 740 degrees Fahrenheit and the trick of keeping the dross down to its lowest limits is entirely a matter of heat and not, as many of the elect contend, that of the material of which the kettle is made. When I get up on my hind legs and make the assertion that I have gotten the best results from a kettle made of cast gray iron, I know that the galvanizers who read it will laugh their heads off, but nevertheless it is true. When I make the additional assertion that our experience has taught us that a cast iron kettle properly designed lasts much longer than those made of Swedish iron or fire box steel, I know that they will give me up as a hopeless case and fit only to grace the inside of a madhouse. Yet facts are facts, and while I admit that somewhere in this article I have advised the purchase of a kettle from a reliable house who makes that sort of thing, I still contend that my way is the best, at least for kettles holding from five to ten tons of spelter, and that it does not matter in the least what material the kettle is made of in its relation to the formation of dross. So again I repeat, see that your watchmen are very carefully instructed in the handling of the fires and never

*Superintendent, National Meter Company, Brooklyn, N. Y.

let the temperature creep up beyond 800 degrees Fahrenheit, for the moment that degree of heat is exceeded while the kettle is dormant, the dross begins to form.

Perhaps a little happening that occurred in Brooklyn not so long ago will better illustrate matters. A concern had been paying the customary 1¾ cents per pound of casting for having its galvanizing done by a job-shop, and as their business had grown very fast they decided to install their own galvanizing plant. The very first night that their watchman had been attending the fires, he had kept them up so well that when the "alleged" galvanizing crew came there in the morning they found not more than two inches of fluid spelter in the kettle; the rest being dross so solid that it was a hard matter to poke a pointed bar into it. Consternation reigned supreme, the boss was telephoned for and he came on the run. All that day they kept the fires roaring by his orders, as he had figured that the trouble was the result of too little heat, when, as a matter of fact, there was too much. Well, to make a long story short, at the end of the day he phoned to a "regular" galvanizer to come over and tell them where the trouble lay, and then to save the kettle he had them dig out the dross and told them to hire a crew and a watchman who knew their business. The boss took the hint and fired the whole caboodle, which ought to have included himself, and from that time on they have had but very little trouble.

The quality of spelter used in galvanizing is a very important factor, and for a beginner it would be well to fight shy of the re-melted kind purchased from scrap metal dealers, as the same is usually loaded with dross, for, as we have explained, you will make enough of your own dross without buying it at spelter prices and ready made. Any good brand of prime Western spelter will answer, though some are much better than others, and as I am not in the business of selling spelter, you will have to find out for yourself which is the best for your line of work. Though I will help you to this extent, that if you are stuck with a poor lot of spelter it can be thinned with this "dope": copper, 80; antimony, 15; and aluminum, 5. A four or five pound slab of this stuff mixed up in your kettle will help you out a lot, though I do not advocate its continued use.

I use coke as fuel although we have city and producer gas on the premises, and I might add that we also have three thousand gallons of fuel oil stored at our plant, but I still stick to coke—and, by the way, it is the "by-product" or "gas-house" coke that I use. After looking over matters I cannot see any economy in substituting any of the above fuels for coke, and let me tell you why. City or water gas at eighty cents per thousand cubic feet is simply out of the question, not so much on account of the expense, but because of its unreliability in richness. Producer's gas, with its one hundred and twenty-five British thermal units, is rich enough if you have sufficient volume, but as our producer's are banked over night the quality of the gas is practically nil. Fuel oil is the real thing, but it would mean that a tankful of it would have to be placed at an elevation so that it would give sufficient pressure to atomize it with the help of a fan blast of at least eight ounces, and as our power plant is shut down at night the fan will not run itself. So it is coke for ours until such time as we can draw power from the air.

The selection of the acids used in galvanizing, or rather, the makers of the acids such as hydrofluoric, muriatic and sulphuric, is an easy matter if you will decide to buy from none but reliable houses. I might state I have bought hydrofluoric acid so poor that a glass bottle immersed in it for three days was not even etched, and I have had sulphuric and muriatic acids sold to me that were so weak that they could be used as a face bleach, and I am telling but the simple truth. Again, I have been stuck on sal ammoniac or, as some of the dealers call it, "zinc ammonial chloride," as it makes a noise like money for the seller.

Mention has been made in this article of the brick wall that surrounds the kettle. In mentioning it I speak of what the other fellow did and does yet, but not your "Uncle Dudley," as that brick wall business did not make a hit with me from the first go-off, so I made a "layout" and full sized at that, and determined to use cast iron plates instead of brick. After over three years of use they are still in business at the old stand and doing well, without having to spend a cent for repairs during that time, which is more than can be said of any brick curbed galvanizing outfit.

SHALL WE HAVE A TIN FAMINE?

From time to time we are threatened with scarcities of various sorts, not only of food but of other materials necessary to use in our daily vocations—coal, wood, copper, india rubber, etc., and now, as a subject of alarm, comes tin.

We have substitutes for several of the materials which bade fair to become scarce, but as yet there is nothing known which can replace this metal. The price is rising steadily, and the production decreasing, while the demand is constantly increasing. According to an alarmist in one of the German papers, the entire production of tin in the world in 1910 was only 105,704 metric tons. While this metal is very widely scattered over the earth's surface, yet we find but very little thereof in any one place. Most of it comes from the Straits Settlements, the rest from Australia, China and Cornwall. It seems as though the natural supply in Malacca (which in 1910 yielded 54,000 tons, or more than one-half of the entire world's production) is nearly exhausted. The earth's surface has been, as it were, searched with a fine-toothed comb, but new mines are not found—unless, as was the case some years ago in America, they have been "salted."

This scarcity touches very closely all those businesses in which iron or other metals are coated with tin by the "heat process." Zinc will do for some purposes, lead for some others; mixtures of these and of antimony, with tin, have also been tried.

This lack of tin comes home to all of us, as the greater quantity is used for coating sheet iron or sheet steel, and the greater portion of this latter material is used for air-tight cans for fruit, etc. For this purpose tin has the advantage that it neither affects the contents of the cans, nor is affected thereby, also that it furthers the soldering process. And then we need tin for the solder also.

As far as I can see, the only help which at present offers itself in this direction is to drop the process of coating sheet iron and steel by immersing in a bath of melted tin, and take to galvanic deposition, which effects the coating much more regularly, and at the same time is accompanied by no waste through alloying of the iron with the tin in the bath.

ROBERT GRIMSHAW.

GERMAN SILVER SOLDER.

A good solder for German silver is said to be composed of the following: Copper 45, nickel 10, and zinc 45 parts; it melts easily and flows well.

CORES AND COREMAKING

A Description of Their Use in the Manufacture of Plumbing and Steam Brass Goods.

By P. W. Blair.*

The making of cores is one of the most essential parts in the manufacture of plumbing and steam brass goods and the different manufacturers of the above line of goods have within the past ten years begun to realize and develop their core departments to a state of efficiency.

The majority of brass manufacturers employ girls on this class of work, as the cores are small and of an irregular shape and delicate in construction. If one studies them at work they will be apt to note the few false moves they make and the interest they take in their work. Every movement is a part of what is wanted to make a core and there is a number of movements made in the manufacture of some cores. See Fig. 1, which illustrates one of the most delicate and intricate cores made owing to its length, diameter and irregular shape. A good day's output on this compression basin cock body core averages three hundred and fifty to four hundred for a nine hour day by an experienced coremaker. A core of this kind has to be properly vented to ensure a perfect casting as the venting allows the gas to escape when pouring the metal into moulds.

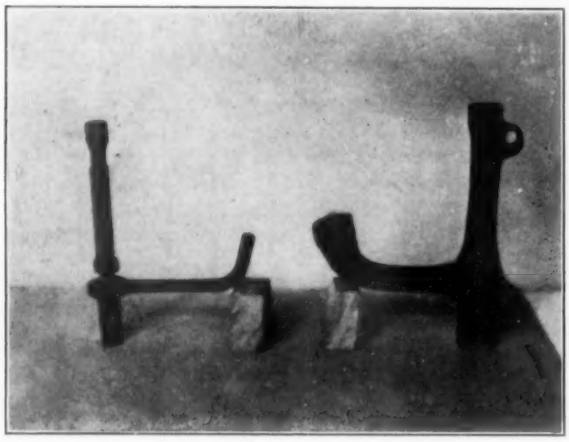


FIG. 1. LOW DOWN BASIN COCK CORE AND CORE DRYER.

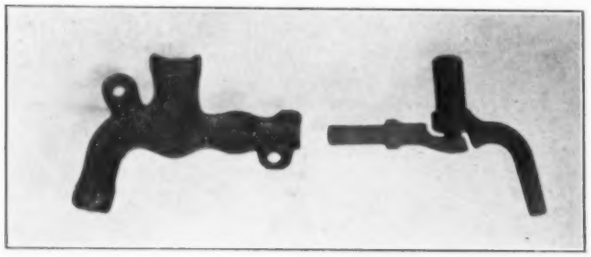


FIG. 2. COMPRESSION BIBB COCK CORE AND CORE DRYER.

There are three vent wires used in this core which must be laid in and extracted in the course of its manufacture.

Another important factor in general use on all delicate cores is what is termed core dryers, which are used in taking the core from the core box and also used for baking in the oven; they reduce breakage to a minimum and allow the rapid handling of them. Fig 1 illustrates also core box and dryer used in the making of this core. Fig 2 illustrates a compression bibb body core, another delicate and irregular core. The average output on this core is 450 to 500 per day.

*Superintendent, Brass Finishing Department, Mueller Manufacturing Company, Sarnia, Ont.

Originally many core boxes were made of wood, but for many reasons this is not advisable where any number of cores are required. If there are only a few cores to be made from a certain pattern or in a year's output or if the cores are of a large dimension it is then practical. Brass is used to a large extent in making metal core boxes, as it wears fairly well and machines good although the corners round off and wear. The best material to use is slab machine steel as it has good wearing qualities. The wearing qualities of machine steel are indefinite, as after the core box is finished it can be case-hardened and it is almost indestructible. See The Metal Industry, May, 1913, issue, for a full account of the modern method of manufacturing metal core boxes.

FIG. 3. CORE OVEN.

For the simpler or straight plain cores multiple core boxes are used and as many as eight to twelve cores are made in the same box at one time, which increases the day's output to as high as three thousand to four thousand five hundred per day.

In the vicinity of Pittsburgh, Pa., the multiple core boxes are used to a large extent and a girl averages as high as 20,000 cores per day working ten hours. The cores are one-half inch. The method that is in use in manufacturing these cores is as follows. Sixteen cores are made in one box, the box being known as the multiple core box. The core sand used is a sharp sand tempered with oil, no wire or rods being required, as the cores are dried in the box they are made in. No handling of the cores is required. A core conveyor runs right at the hand of the coremaker and as the cores are made the one-half

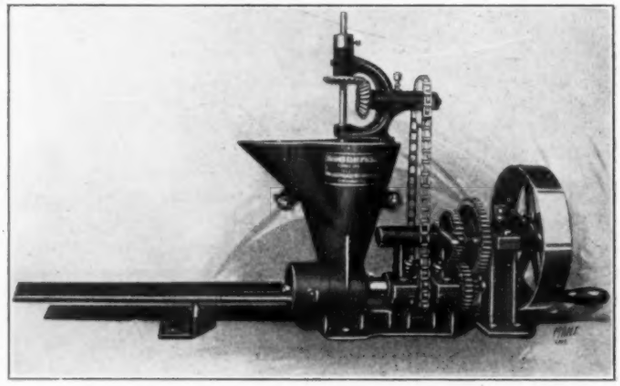


FIG. 4. A CORE MAKING MACHINE.

of the box with sixteen cores is placed on the conveyor and run through a core oven shaped like a tunnel, and when they come out the other side they are baked. They are then taken from the box and the box returned to the coremaker on the conveyor.

The average output for a coremaker on globe and gate valves is on 2 inch size 250 complete cores, on 1 inch size valves 750 to 800 complete cores.

It is a practice to-day in the Pittsburgh district to manufacture the smaller sizes of valves in multiple core boxes and they are having success with them.

The tempering and mixing of the sand used in making cores plays an important part in their manufacture. On large work glucose and rosin are used to a large extent. The sand mixture used on the general run of work is composed of 75 per cent. Windsor sand and 25 per cent. Lake sand mixed with linseed oil.

The sand must not be too dry when used, as the cores will crumble or the metal will burn into them and leave the castings rough on the inside.

Linseed oil acts as a binder and strengthens the cores when used and is one of the best ingredients to use in coremaking. Fig. 3 shows core oven in use in most of the up-to-date brass foundries; these ovens are made for any size of work and they make the handling of cores easy. They are made sectional and in any size.

Owing to the delicacy of some of the cores used on water and steam goods, coremakers' benches are built solid and independent of the persons working in conjunction with them. Coremaking machines have come into practical use in making cores and in the straight plain round cores from 5/8-inch diameter upward they have been found very practical. Fig. 4 shows a modern one and Fig. 5 shows some of its shapes.

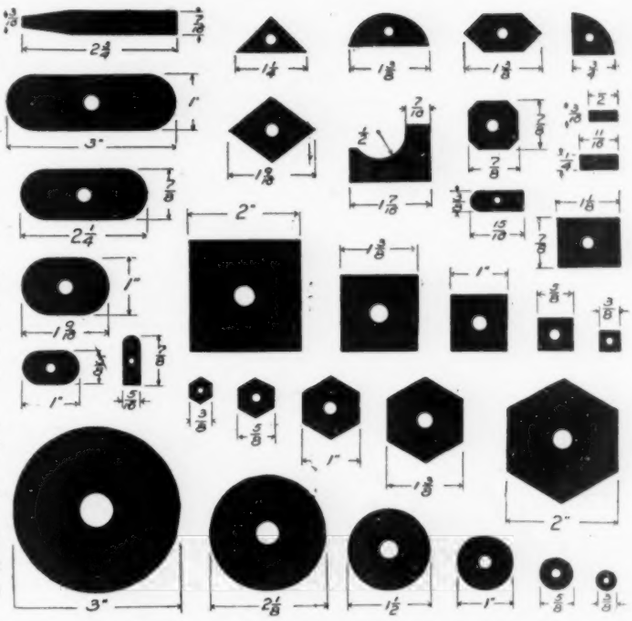


FIG. 5. SOME SHAPES OF CORES MADE.

GERMAN MANUFACTURE OF IMITATION GOLD LEAF

[United States Consul General Robert P. Skinner, Berlin.]

Imitation gold leaf, such as is used in Germany for the manufacture of gold paper, is known in the German trade as blatt-metall, and the paper itself is called brett-formen. Mr. George Nicolas Ifft, the American consul at Nuremberg, reports that the blatt-metall, which is manufactured in Nuremberg, can be bought from the bronze-powder manufacturers at 1.65 marks (39 cents) per package of 500 leaves for the cheapest grade, and at 1.75 to 1.85 marks (42 to 44 cents) for better grades. The leaf is also designated by the manufacturers as blatt-metall No. 1.

This blatt-metall is produced from a raw material known as tombak (tombac), which is a metal in plates (tombak-blech). This material is composed of 100 parts of copper and 15 to 20 parts of zinc. It is also known as zahn- or kompositions-metall.

ALUMINUM, GOLD, AND SILVER FOIL.

The following is a translation of all that is contained on this subject in Blücher's Handbook of the Chemical Industries:

1. Blatt-aluminum (aluminum foil) is expanded by beating with a hammer. It decomposes boiling water with development of hydrogen, while compact aluminum has no effect on water. In a flame it burns with a vivid light. It belongs to the purest kinds of aluminum in the market, as even minimal admixtures would considerably influence the expansibility. Two hundred and fifty sheets of blatt-aluminum, 1.60 marks (38 cents).

2. Gold leaf, gold foil. Genuine gold leaf consists of finely beaten gold, which contains either some copper (red gold leaf) or some silver (yellow gold leaf). Genuine gold leaf, per book of 12 bundles, 5.90 marks ($1.40).

Imitation gold leaf (rauschgold, schaumgold—leaf brass, tinsel) consists of an alloy of 75 to 85 per cent. copper and 15 to 25 per cent. zinc. Unlike the genuine gold leaf it is easily dissolved by nitric acid. Imitation gold foil, per book of 10 bundles, 0.70 mark (17 cents).

3. Silver Leaf. Very pure beaten silver; very small admixtures of other metals would make the beating impossible by impairing the expansibility. Genuine blatt-silber, 300 leaves, 1.55 marks (37 cents).

Imitation silver leaf (rauschsilber, schaumsilber) consists of an alloy of 90 per cent. tin with 10 per cent. zinc. While genuine silver leaf dissolves in nitric acid clearly, from the solution of rauschsilber white insoluble oxide of tin is separated; the filtered solution when supersaturated with ammonia will further show, after the addition of sulphide of ammonia, a white sediment of zinc sulphide. Rauschsilber, per package of 10 bundles, 0.70 mark (17 cents).

OTHER ALLOYS RESEMBLING GOLD.

The following is from Fischer's Handbook of Chemical Technology:

Tombak (tomac, pinchbeck, red brass, red cast, rose copper) is an alloy resembling gold, which contains 85 parts of copper and 15 parts of zinc. In Nuremberg and Fuerth an alloy is made of 2 parts of zinc and 11 parts of copper, which the metal beaters in those places work into gold leaf. Other copper-zinc alloys having a color resembling gold (which, however, are rarely made) are prince metal, semilar (pinchbeck), oread, Mannheim gold, etc. Delta metal is composed of 60 parts of copper, 38.2 parts of zinc, and 1.8 parts of iron. Sterro metal is of similar composition, but harder. Muntz metal is used in England to a great extent for ship sheathing, bolts, ship pegs, etc. It consists of copper and zinc in proportions which vary between 50 per cent. zinc and 50 per cent. copper to 37 per cent. zinc and 63 per cent. copper.

There were 73.4 metric tons of gold and silver leaf (value $313,446) exported from Germany in 1913, of which quantity the United States took 13.8 tons; Great Britain, 9.9 tons; Russia, 7.5 tons, and France, 4.6 tons.

PROGRESS OF ALUMINUM

A Description of Some of the Latest Applications of Aluminum to Manufacturing Chemical Industries.

Aluminum has now reached a stage in its development when it deserves the earnest consideration of manufacturers in the chemical industries. The metal is rapidly taking up a position of high importance in a widening field of utility, and it is impossible in an article of this nature to do full justice to the innumerable applications that naturally suggest themselves. It is proposed, therefore, to confine our attention only to those branches of chemical industry in which aluminum has been used, and is being used now, with definite satisfactory results. The advantages of aluminum peculiar to each branch, and the considerations which led to its adoption in any case, will be briefly indicated for the benefit of those interested.

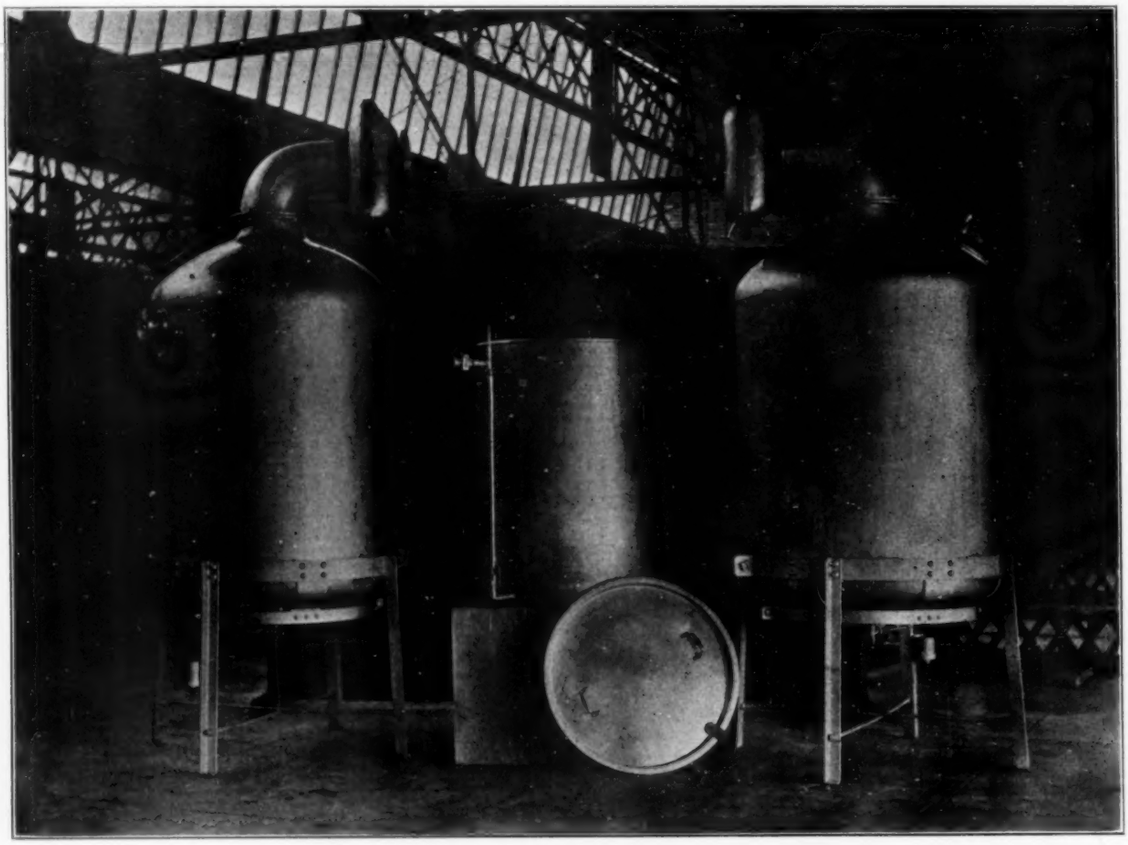


FIG. 1. ALUMINUM APPARATUS USED FOR MANUFACTURE OF LINSEED OIL.

Here it might be well to touch on the circumstances which have rendered the use of aluminum practicable on a large scale. For a long time manufacturers have realized that in aluminum they had at their disposal a clean, pure material, lightest and, weight for weight, one of the strongest of commercial metals. Unaffected in its commercially pure state by organic acids and secretions, its salts colorless and absolutely non-poisonous, practically impervious to nitric and sulphuric acids, aluminum bid fair to quickly outrival all available materials in the construction of brewing vessels, varnish pots, condensing stills and in any chemical process demanding a high standard of purity in the final product.

Two considerations militated against its immediate development on commercial lines:

(1) Capital expenditure.

(2) Constructional difficulties in any but the smallest size of vessel.

(1) The difficulty of first cost has been annulled by the heavy reduction in the cost per ton during late years, rendered possible by improved and enormously extended manufacturing facilities. In this connection it is well not to lose sight of the fact that for a given gauge of plate, 1 ton of aluminum is equivalent to 2.7 tons of tin, 2.88 tons of iron, 3.33 tons of copper, and 4.22 tons of lead. On the score of first cost, then, aluminum now presents a very attractive proposition, which, coupled with the necessarily low up-keep charge on a metal essentially free from corrosion, heavy handling, and frequent scouring, accounts in part for the extraordinary spread in the use of this material in industrial plants.

CONSTRUCTIONAL DIFFICULTIES.

(2) This temporary set back has been most effectively disposed of by the introduction of a clever process of autogenous welding. Soldering of aluminum is admittedly unsatisfactory in connection with chemical plant. At all times a difficult and unreliable process, it introduces alloys of a different position on the electro-chemical scale, setting up galvanic action and all the evils of electrolysis and subsequent corrosion. Neither does aluminum lend itself readily to riveting, its malleable nature and low yield point being serious obstacles to a sound, lasting joint, where extremes of temperature and vibration are likely to be encountered. But by a process

of actual welding, aluminum vessels of any size or shape can now be made from the metal in its purest sheet form. Fig. 2 shows a typical vessel made under this process. It is used for distilling and has a smooth and homogeneous, non-porous surface and is easily cleaned and shows no leakage. It may be safely stated that aluminum is suitable for practically all purposes, provided it is not brought into contact with hydrochloric acid, halogen solutions or caustic alkalies. Some of the better known branches of the chemical industry in which aluminum plants are in daily use are as follows:

BREWING.

The very large and rapidly increasing number of breweries, both in this country and abroad, in which aluminum is being employed, is in itself a definite guarantee of the

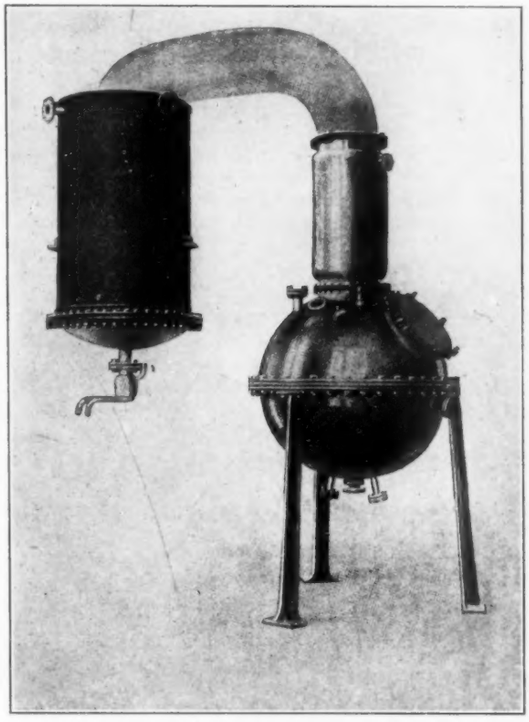


FIG. 2. DISTILLING APPARATUS, SHOWING CONDENSER AND CONNECTING PIPE OF ALUMINUM.

excellent qualities of the metal in this connection. In the construction of fermenting tuns, vessels for the treatment of chilled and filtered beer, etc., aluminum has taken up a premier position by weight of sheer merit. The following considerations will serve to indicate the reason why aluminum alone satisfies the technical requirements of the up-to-date brewer:

(*a*) Aluminum has no effect whatever on the reproductive power of yeast cells, and better crops are secured than in copper vessels.

(*b*) It is possible to rack earlier from aluminum vessels, and thus in a sense the capacity of the plant is augmented.

(*c*) A new wooden vessel probably has no rival for fermentation purposes; its great disadvantage is the rapidity with which it becomes porous and tends to harbor septic matter in such quantities as to render cleaning a heavy expense, or even impossible. Aluminum is of a close, non-porous nature; the smallest speck of scale or foreign matter can be instantly detected against its white surface, and easily removed. None of the costly scouring inseparable from the use of copper is necessary with aluminum, nor is the frequent and difficult sterilizing which wood involves. The metal is essentially clean and the ease with which it can be kept so is a desirable factor in the reduction of running costs in this connection.

(*d*) Aluminum is not subject to mechanical damage, as are enamelled iron and steel. Owing to its lightness it is not so liable to rough handling, and heavy scouring is found unnecessary. There is no enamel to chip, nor is tinning necessary or even desirable. It is the same pure metal all through, and proves a more satisfactory investment throughout for a given capital expenditure.

(*e*) The salts of aluminum are colorless and non-poisonous. Unlike tin it does not destroy the brilliancy of the beer; unlike iron it imparts no unpleasant taste. It is perhaps impossible to overestimate the importance of these two qualities alone, in days when competition is keener than at any period in the history of the trade. The presence of 1/7 of a grain to the gallon of iron

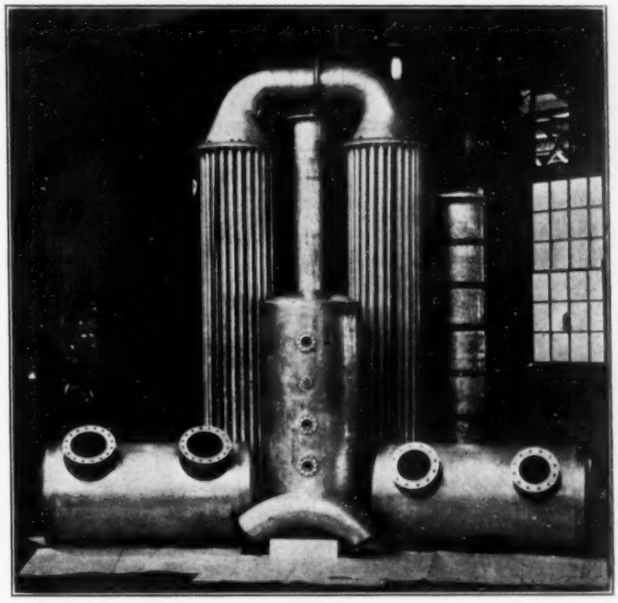


FIG. 3. PART OF ALUMINUM CONDENSING APPARATUS FOR STEARIC ACID MANUFACTURE.

oxide is in itself sufficient to ruin the finest brew, and it has been shown that copper is capable under certain conditions of being taken into solution with the beer and causing a poisoning of the yeast. Aluminum then can be safely recommended for use in construction of fermenting tuns, yeast backs, stillions, tubs and wagons, pruning vessels, pitching pails, storage and racking tanks.

VARNISH INDUSTRY.

The placing on the market of a metal of high thermal conductivity, resistant to the action of fire gases, easily handled and as easily cleaned, aroused some considerable interest among those of the varnish industry who make a point of keeping in touch with current progress. This, followed by the practical demonstration of the fact that varnishes can be produced from aluminum pots many shades paler than from those of any other commercial metal, insured the immediate consideration it has received at the hands of manufacturers.

The salts of aluminum being entirely colorless, allow the same shade of varnish to be made from a cheaper gum or a paler varnish from the same gum. In addition, manufacturers will appreciate the fact that, owing to its inherent lightness, an aluminum pot escapes a con-

siderable amount of the rough handling often meted out to its heavier prototype; and the frequent and severe scouring essential to the efficient use of iron and copper vessels, which may not be tinned in connection with varnish manufacture, is wholly avoidable by utilizing the peculiar properties possessed by aluminum.

FOOD STUFFS.

This heading covers a very wide field indeed, and manufacturers have been quick to recognize the decided value of aluminum as employed in the various processes. Its general cleanliness and ease of handling would alone single it out as worthy of consideration in this particular sphere. Copper requires tinning and retinning at heavy expense, and enamelled iron is difficult to efficiently repair when once the enamel is chipped or pierced. Aluminum suffers from no defect of this nature, and hundreds of tons of the metal already in use in this connection daily demonstrate the absolute satisfaction it gives under the most trying conditions of high temperature and vacuum. As already indicated, the salts of aluminum are non-poisonous, colorless and tasteless, and in the manufacture of syrups, essences, etc., demanding a high degree of purity, the use of this metal is ideal. This fact has been quickly taken advantage of in the construction of boiling pans, funnels, piping, buckets and storage tanks, and here again, as always, the advantage of a metal initially clean and easily kept in that condition emphasizes itself.

SUGAR REFINING.

In sugar refineries bi-metallic tubes are now being used in the most modern design of evaporator, the outside of these tubes being of copper, the inside of aluminum. A tube thus constructed offers considerable advantages over either copper or brass tubes, in that any scale forming on the outside can be quickly removed by caustic potash, while the aluminum lining protects the copper from the corrosive effects of ammonia present in the steam. In this branch of industry also, sieves and screens made wholly of aluminum are becoming increasingly popular.

JAM MAKING.

It is generally known that fruits contain acids, and that these, when brought in contact with the metals used in the process of jam making, form salts which may be highly injurious to the consumer unless the metal chosen is suitably resistant to acid action. Copper in this connection forms a highly dangerous verdigris on its surface after standing only a few hours. Aluminum being entirely free from any drawback of this description, has made an instant appeal to the enterprise of manufacturers, and its use in this industry is now generally recognized as an important factor in promoting general cleanliness and purity of the final product.

Aluminum is for all practical purposes entirely unattacked by the fatty or the vegetable oils, and large storage tanks made of this metal have given every satisfaction in dealing even with hot oleic acid in bulk. In the preparation of stearic and palmitic acids it has been discovered that aluminum is less liable to corrosion than any other commercial metal, and for this reason the stills, condensing coils, and vessels for the conveyance and storage of these commodities are now being made of aluminum with greatly enhanced facilities in working. The edible oils and fats were notoriously difficult to handle until the development of aluminum on its present scale. Wood is an unsatisfactory material owing to its unfortunate propensities for harboring micro-organisms, which set up decay in the wood and pollution of the contents of the vessel.

The immunity, which aluminum has been found to possess, from any attack of stearic acid, must also afford an explanation for the growing popularity of this metal with the soap and candle manufacturers. As used in this industry, stearic acid must be free from taint of coloring matter, a condition difficult to fulfill and still more difficult to maintain in the case of copper, where heavy deposits of verdigris accumulate whenever the plant happens to be laid idle, wearing off and staining the products of the first few days' reoperation.

EXPLOSIVES.

Aluminum is said to be the best commercial metal capable of withstanding the combined or separate actions of sulphuric and nitric acids, and is, therefore, extensively used for nitrating pans, the grids of centrifugals, and other accessories utilized in the manufacture of explosives.

DYEING.

Owing to its non-corrosive properties and great lightness, aluminum at once suggests itself as a suitable medium in the construction of dye works plant, and tanks of all descriptions that have been installed in this connection are producing a crop of repeat orders that augurs well for the future of the metal in this extensive branch of the chemical industry.

Aluminum is being used now to an increasing extent in the production of hydrogen peroxide, formaldehyde, citric acid, glycerine and chemicals of the lesser known types too numerous to enter into detail with here. Steam heating coils of aluminum are in daily use in the oil industry, and have proved their unvarying reliabilty over a wide range of temperatures up to some 300° C. Transporting wagons for the conveyance of all sorts and conditions of oils, etc., are now a sound investment where aluminum construction is specified, the enormous reduction in weight in a train of such wagons considerably influencing the decision of manufacturers who contemplate augmenting their rolling stock.

The use of aluminum as a metal that has definitely proved its worth, is recommended by manufacturers, then, in the construction of:

Tanks, stills, crystallizing trays, vacuum pans, condenser coils, evaporating pans, pressure tubing, cooling and filter trays, percolators and many other forms of apparatus that may suggest themselves. The examples that have been selected from the various branches of chemical industry are sufficient to indicate the wide field of utility which aluminum has made for its own in open competition with other metals. It is inevitable, however, that from time to time other openings must occur where the peculiar properties of aluminum will be profitably employed.

[For much of the above matter relating to the development of the use of aluminum in chemical plants we are indebted to Bulletin No. 144, issued by The British Aluminium Company, Ltd., Arthur Seligman, U. S. Agent, 165 Broadway, New York.—Ed.]

GOVERNMENT STAMP ON SWISS PLATINUM.

[United States Vice Consul General Frank Bohr, Zurich.]

The Swiss Federal Council by decree effective March 1, 1914, provides that domestic manufacturers of platinum products may be officially stamped to indicate the platinum content, as is already done on gold and silver products. Upon request of the manufacturer, seller, or purchaser, articles having a minimum platinum content of 95 per cent. will receive the official stamp of an Alpine goat (Gemskopf). Iridium is to be put on par with platinum in determining the fineness of content. On articles made up partly of gold and platinum the platinum may also be stamped in the same manner.

METAL CONCENTRATION vs. DENSITY IN PLATING SOLUTIONS

AN ARGUMENT FOR THE ELIMINATION OF WASTE OR INERT MATERIAL IN PLATING SOLUTIONS.

BY CARL DITTMAR.*

In electro-plating with cyanide solutions there are three agents necessary. First, electrical energy, second, cyanogen, and third, metal. Of these three, only one pays us profit on our investments, and that is metal. The manufacturer of plated material is paid only for the metal that he deposits on articles. The consumer is not interested in anything else, therefore, the problem has always been, and will continue to be, "How can we get the metal in solution more cheaply?" and "How can we raise the efficiency in our plating bath to get it out of the bath at the lowest possible cost?" It is therefore only logical that the plater should strive to eliminate from his solutions all unnecessary materials and confine himself to the active factors of electro-plating, that is, cyanide and metal, especially when he considers that all other materials lessen the efficiency of his solution and increase his cost of production.

With the realization that for years we have worked with solutions containing at least 50 per cent. inert matter that have no intrinsic value and act only as a detriment to the rapidity of the electro deposit, we have come to the stage in the evolution of the plating solution when we will strive to obtain a solution, correct both theoretically and practically, a solution which will enable us to introduce more metal in proportion to the density. More metal means quicker deposit, quicker deposit means more out-put without increasing tank area and this means efficiency and economy. The progressive plater will, therefore, welcome the introduction of the cyanides of copper, zinc and silver on a commercial scale. He may be slow to realize the importance of this evolution, but when he stops to realize that in the composition of his copper, brass and bronze baths there lies dormant at least 50 per cent. of inert material that he cannot eliminate because it is in chemical combination with the material he uses, he will appreciate that with the introduction of the metal cyanides into his bath in combination with cyanide he adds only the active principles of his solution, metal and cyanogen.

The plater must appreciate that when he adds so-called carbonate of copper to a cyanide solution that copper cyanide is formed and when he adds zinc carbonate, zinc cyanide is formed. At the same time, however, he has introduced into his bath at least 50 per cent. of impurities and inert matter which these carbonates contain. As we are endeavoring to simplify and standardize our plating baths we can readily see the advantages of introducing cyanide of copper and cyanide of zinc direct instead of in a round about way, especially in view of the fact that by so doing we keep our solutions free from objectionable material. Once we use the metal cyanides and cyanide exclusively, we can control our solutions more readily as we have only two factors to contend with. One of the largest brass corporations in the country, if not in the world, has been experimenting for the past year with copper, brass and bronze solutions and has obtained the highest possible efficiency from their solutions by eliminating sodium and potassium carbonate which form when so-called carbonates are used.

It has been estimated, that with the use of metal cyanides at least 25 per cent. is saved in making up and replenishing plating solutions as compared with the older method of using carbonates and this is solely due to the high metal content of the metal cyanides, their solubility in cyanide solutions and the fact that they require only about one-fourth the amount of cyanide to put in solution as do the so-called carbonates. For instance, with the introduction of copper cyanide into your bath you add 70 per cent. metal with which is combined 30 per cent. cyanogen (the active principle of cyanide), as against 50 per cent. metal as contained in the so-called carbonates, which is combined with 50 per cent. of inert matter in the form of sodium carbonate. With the elimination of these objectionable impurities and inert matter, you have solved the problem of "How to increase the metal concentration without raising the density of the bath by using only the active principles of cyanide plating."

Thus, making up a solution with copper cyanide for instance, you make up a working copper bath, using only one pound of material while to get the same proportion of metal in solution in the form of carbonates, it is necessary for the plater to use at least 3½ pounds of chemicals. There is no logical reason for introducing over three times the quantity of salt into the bath and thereby raise the density of the solution.

The writer, in experimenting with the metal cyanides has been able to make up a working copper solution using only two ounces copper cyanide and two ounces of cyanide of sodium per gallon of water. To obtain a beautiful copper color immediately on antimony and lead, the same solution was converted into a brass bath by the addition of only two-thirds ounce of zinc cyanide, one-third ounce ammonium chloride and two-thirds ounce of cyanide of sodium and at once obtain a perfect brass deposit, the bath standing at only three degrees Baume. This goes to prove again the absolute fallacy of loading up a solution with unnecessary material when this can be avoided. The copper solution, above mentioned, will therefore cost the manufacturer a trifle less than eight cents and the brass bath less than eleven cents per gallon.

Unfortunately, the plater, as well as the purchasing agent, looks first upon the price of the respective metal salts but he must consider that the salt, as such, has absolutely no value—it only has a monetary value when put in solution. To determine the cost, one must take into consideration what is put into the solution and what is taken out. Based upon these facts, the use of metal cyanides will enable one to cut chemical costs at least one-fourth for installing the solutions and maintaining it at standard. One must consider how much cyanide is necessary to take up the copper carbonate and also how little cyanide it requires to put the metal cyanides in solution. It is possible then to arrive at a proper basis for comparing comparative costs.

In addition to this, the highest efficiency is gotten out of the plating department and if this can be done, as is possible with metal cyanides, at a decided reduction in cost, an ideal plating condition has been arrived at, both as far as the plater and the manufacturer are concerned.

*Trisalyt Department, Roessler & Hasslacher Chemical Company.

PROFITS OF ALUMINUM WORKS.

The report just issued by the Aluminum Industry Company, Neuhausen, Germany, said to be the largest of the Continental aluminum companies, shows that, like the British company, in 1913 it had a good year, the net profit being $1,288,000, as against $883,000 in the previous year. The dividend is again to be 20 per cent.

A NEW TILTING REVERBERATORY MELTING FURNACE FOR METALS

An Article Dealing With the Advancement of Metal Melting Practice.

By J. A. Doyle.*

THE MELTING PROBLEM.

The melting of metals involves so many details from the metallurgical, as well as the commercial side, that it is almost impossible to determine on any one method of melting or type of furnace that will suit all conditions. While there is no doubt that there are many operations which, by reason of metallurgical requirements, demand the use of crucibles either in the pit or tilting type of furnace, it has been proved that there are still many others in which total operating cost is in itself the determining factor and for which the tilting open-hearth or reverberatory type, with proper operation and attention with the use of fluxes, charcoal or other reducing agents, is entitled to consideration by reason of the advantages it has in the form of larger capacity with less fuel, labor, and floor space. Each type has its advantages and disadvantages, and the measure of success with either can only be determined by the specific requirements of each case.

NINE ROCKWELL TILTING REVERBERATORY FURNACES AT THE PLANT OF DODGE BROTHERS, DETROIT, MICH.

The development of open hearth practice has indicated the necessity of providing for better melting and operating conditions and of reducing the all-around cost as well. Objections have been made to the blast, either directly against or close to the metal, which is in itself largely responsible for the loss in oxidation and volatilization; to the severe working conditions in charging, skimming, or pouring, when the intense heat from the melting chamber and hot side of the cover is reflected directly into the face of the operator, and the hot metal and chamber subjected to the cooling effect of the atmosphere; to the cost of installation and repair involved in the use of expensive machined castings that either burn or easily distort out of shape. To remedy these conditions there has been developed a simple, inexpensive type of furnace that will do all and more than any other type that is offered for the same purpose can do, and at the same time offers a number of advantages as an inducement for the operator to take proper care of his fire and metal. These advantages and the results accompanying them include:

SIMPLICITY OF DESIGN.

This is one of the main features of the furnace, which involves a tilting melting chamber of simple design and construction, in which the metal is melted without the blast being forced directly against it. The shape of the chamber, the method of combustion, and the application of heat to the metal all combine for its protection. Combustion takes place well above the metal and there is a thorough mixture of gases and freedom from carbon deposits and uniform pressure in all parts of the chamber. The purpose is to melt the charge by the reflection of hot gases under a uniform pressure without subjecting it to direct blast or to the varying temperature and composition of flame. The result is that the temperature and composition of the gases are the same in all parts of the chamber and around the charge, whether the heat be on full or only just enough to keep the metal hot.

CONVENIENCE OF CHARGING.

The metal to be charged is first laid on top of the furnace while the fire is on, where it is gradually warmed, and finally pushed into the chamber as required. There is no loss of time in doing this and the operator is not exposed directly to the heat reflected from the chamber or hot side of the cover, which swings away from him. Neither is the hot chamber or metal exposed to the cooling or oxidizing effect of the air. Ingots or other heavy pieces may be charged without stopping the fire, if desired. With this arrangement, the man, the metal, and the melting chamber are given all the protection possible

*W. S. Rockwell Company, 50 Church street, New York.

and the melter has no excuse for not properly conducting the melt.

CONVENIENCE OF STIRRING AND SKIMMING.

In these operations the metal, the operator, and hot chamber are protected the same as when charging. Alloying metal is charged through the top of the furnace and mixed with the other by stirring through the opening in the spout which enables the operator to get at all parts of the charge without exposing himself to the heat or the charge to the air. Sometimes the charge is skimmed through this opening and at others from the pouring ladle after leaving the furnace. At the end of a run the furnace may be cleaned through the spout, the top opening being closed so as to compel the gases to pass through the lower opening and keep it hot so that the slag will flow easily.

CONVENIENCE OF POURING.

The same protection is afforded while pouring and the fire may be kept on while thefurnace is tilting and the metal covered with a flame to keep it hot and protect it from oxidation while being transferred from the furnace to the ladle. Observations as to the condition of the charge may be taken through the spout without loss of time or heat. Ordinarily the vent of the furnace is through the opening on top and the spout covered. The spout, however, may be used as a vent while pouring or cleaning out the furnace at the end of a run.

FUEL.

The furnace is designed for the use of either oil or gas fuel. Oil in the form of fuel oil, crude oil, distillate, or kerosene, and gas in the form of natural gas, water gas, or city gas may be employed. Producer gas is not suitable, except for metals with comparatively low melting points, because the calorific value of this fuel is not high enough to maintain high temperatures without regeneration. With oil fuel a pressure of 5 pounds per square inch or higher on the oil will do provided it is uniform. With oil any air pressure between 8 and 24 ounces per square inch will give satisfactory results without carbon deposits or variations in temperature or composition of gases throughout the chamber. Pressures above 1½ or 2 pounds per square inch are neither necessary nor desirable, by reason of the power consumption and noise attending the use of the higher pressures.

FUEL CONSUMPTION.

The fuel consumption of this or for that matter any other similar type cannot be definitely determined by the furnace itself, and is greatly influenced by the method of operation and the judgment of the operator who has the power to regulate the melting conditions to suit himself. It depends upon his judgment whether the flame be oxidizing or reducing or whether the temperatures be too high or the blast too strong. The furnace makes it possible to produce either, but it cannot be set or fixed to produce the same result all the time without the same operation. There is embodied in the design the improvements found necessary from the development of this type of furnace in years of practice to produce the best results, but even with these advantages the fuel consumption, as well as the shrinkage of the metal, depend greatly upon the operator. The variation in the size, shape, and composition of the metal, as well as the ideas as to proper methods of charging, condition of metal for pouring, also contribute to the difficulty of fixing the fuel consumption definitely.

For the average run of brass, under these conditions, the fuel consumption per hundred pounds of metal melted will vary from 1½ to 3 gallons of oil, which is equivalent to 200 to 400 cubic feet of natural gas; 675 to 1,350 cubic feet of water gas; or 345 to 690 cubic feet of city gas.

CONSTRUCTION.

The construction of the furnace is simple and substantial throughout. The melting zone is lined with standard firebrick laid in double courses with broken joints, which makes the work of relining simple and low in cost, as the ironwork need not be dismantled for this purpose. Practically all of the material likely to come in direct contact with the heat is of refractory nature and the use of metal parts has been eliminated as far as possible so that the cost of repairs or the loss in time to make repairs is reduced to a minimum.

In actual practice, the No. 117 size, having a nominal capacity of 500 to 800 pounds per charge, was run for 501 heats without necessity for repairing the lining. In this run the furnace melted on an average of 775 pounds of metal per charge with 6 heats per day, and turned out 388,275 pounds of metal, which was employed to make castings for small gasoline engine and automobile parts. The metal was the average grade of red brass, and the shrinkage loss was about 2 per cent. on an average.

Tests have been made to demonstrate the action of the heat against the metal, which involved the burning of wood in the chamber so as to reduce it to light ashes. The furnace has been brought from cold condition to melting heat rapidly without blowing the ashes from the bottom of the chamber, which illustrates the conditions that accompany the elimination of direct blast against the metal and the melting of the charge under a blanket of hot gases under pressure.

These advantages of construction and operation combine to make up a good furnace and provide not only for good melting conditions but low cost of operation, installation and maintenance as well, which, with the protection afforded the metal and the operators, entitle it to consideration for any melting process to which the open hearth type of furnace may be properly applied.

ENGLISH COPPER MARKET IN 1913.

The copper market in England during the year 1913 was subject to violent fluctuations, extending over a range of $75.42 per ton. A trade review shows that the price fell from $375.93 per ton early in January to $307.18 in February; advanced to $367.41 in May, and receeded to $298.06 in June; improved again to $366.80 in September, and declined to $309.92 in December. The average price of standard copper for the year was $332.29, as compared with $355.53 for the previous year, and the average price of best selected ingots $359.48, against $378.50. The average value per unit of ore of 20 per cent. was $2.98, against $3.16 in 1912.

Imports of copper produce into Liverpool, London, Swansea, and other ports during 1913 aggregated 163,441 tons, against 159,852 tons in 1912. Of the total in 1913 the United States supplied 53,038 tons, Spain and Portugal 28,696 tons, Australia 26,669 tons, Chile 18,558 tons, Japan 8,770 tons, Mexico 7,782 tons, and Africa 6,377 tons. The average stocks for the year at Liverpool and Swansea were, in tons fine: Chile, 2,537; United States, 1,455; sundries, 654; English standard, 12,124.

The estimated world's production of copper in 1913 was 998,000 tons, against 1,005,000 tons in 1912, 875,000 tons in 1911, and 851,000 tons in 1910.

DETERMINING WEIGHT OF DEPOSIT

SOME VALUABLE SUGGESTIONS FOR THE CHEMICAL EXAMINATION OF ELECTROLYTICALLY DEPOSITED METAL.

By L. C. WILSON.

One of the most important items in the production of a good plated finish is a knowledge of the weight of deposit which is being applied. It is one thing to produce a finish that is pleasing to the eye, but something entirely different to be assured that it is sufficiently heavy to afford ample protection from corrosion, in the case of iron or steel articles, and to stand up under the wear and tear of constant service. At the same time, a manufacturer likes to feel that his plate is not so heavy that it is liable to peel off and that he is not wasting expensive metal, power and time in producing a coating which is much in excess, as far as weight is concerned, of what the conditions and requirements demand. And yet, few platers, except possibly those doing gold or silver plating, concern themselves about this point. They may see to it that the work is properly prepared and cleaned and then turn it over to ignorant helpers with the result that the parts are left in the plating tank until these helpers feel like taking them out. They do not know how rapidly the solution deposits the metal, and they generally care infinitely less, so that, as a consequence, it is a pretty safe bet the parts have either received a light, insufficient coating, or have been plated much longer than necessary. In any case the results are bad and constitute a poor business policy. Putting a deposit of excessive weight on a part when it is not required is not a sign of honest workmanship; it is an indication of wasteful carelessness more than anything else, and seems to increase manufacturing costs unnecessarily.

The writer has seen high grade plumbing goods, particularly faucets, with a nickel coating which was little more than a "flash" and wore through after only a few weeks' service. This class of parts should receive a very liberal deposit and would then last almost indefinitely. On the other hand, articles which are not ordinarily subjected to wear have been examined and found to possess a much heavier coating than really needed. In these days of cost cutting and lively competition there is no waste which is too small to be noticed, and there is no place for the man who is not always on the lookout for the little leaks which may not amount to much individually, but taken altogether make all the difference between a profitable business and one that barely pays enough to keep it going. At best, plating is not an economical process and is subject to a good deal of practically unavoidable waste, and if not carried out with strict attention to every detail it may be the source of serious losses.

In general, metal finishes may be divided, roughly, into three classes: first, those which are applied for the sake of appearance only; second, those which are applied for the sake of protection from corrosion or wear; third, those which are a combination of these two. Naturally, most finishes fall into the last class, although generally protection or appearance will predominate. As noted, these classifications are not absolute, inasmuch as a certain standard of appearance is required even when finishes are applied purely for protective purposes. On the other hand, in the case of those finishes applied merely for the sake of appearance, some measure of protection is incidentally afforded.

To go at the subject in a scientific way, each plated part should be carefully considered, individually, as to the protection from corrosion which is desired, the amount of wear to which it will be subject, and the quality or appearance of finish desired in the completed part. Under these circumstances it ought to be an easy matter to decide whether a deposit of nickel, say, amounting to 10 milligrams per square inch, will be required in order to give a satisfactory finish, or whether 3 milligrams per square inch will be sufficient. It may seem like a big undertaking to go over all parts in this way, but in reality it is not and in most cases, at least, will be well worth doing. Having once determined the proper weight of deposit, the next thing to do is to find out how long it takes to produce it, under definite conditions of voltage, amperage and amount of work in the tank. This involves the actual determination of the weight of metal deposited on a certain area of one or two parts.

It is, therefore, the purpose of this series of articles to outline as simply and clearly as may be some short methods for determining the metals which are most commonly plated. Through their intelligent use it may be possible for any plater to know the exact amount of metal being deposited per square inch on any plated part, so that he can adjust conditions to give a satisfactory coating without unnecessary waste of time or material. In giving these directions, all refinements which are not absolutely essential to accurate work have been left out, and every effort has been put forth to make them of the greatest possible value, and it is felt that if they are carried out with reasonable attention to precautions and details they will in almost anybody's hands give results which are plenty close enough for all practical purposes. It should be remembered that good results in any line of work demand a certain amount of care and attention, and this is especially true in chemistry. Anyone who uses carelessly made solutions and dirty apparatus, or is slovenly in his manipulation cannot expect to get trustworthy results. Following are some suggestions regarding equipment for a small laboratory.

LABORATORY.

Any small room which is clean and free from dust and well lighted will be satisfactory. It should be as free as possible from fumes, therefore, it is better to have it somewhat apart from the plating room. A work table and a few shelves for bottles and apparatus will be required, and a small hood connected to a flue leading to the outside will be very useful when working with poisonous or offensive gases. If possible, it should have running water, both hot and cold, and sewer connections, although these are not strictly necessary. If gas is available, it will be very convenient, although an alcohol lamp may be used for heating whenever this is necessary.

APPARATUS.

In setting up the laboratory, each person will have to be guided largely by how deeply he cares to go into things, the analyses to be made and the money available for such purposes. A little ingenuity may be the means of saving a good many dollars. A good analyst can get surprising results from a few simple pieces of apparatus; others, less resourceful, may require more and better tools. The pieces given below may be considered indispensable.

BALANCE.

This is one of the first requisites for quantitative chemical work. A good balance sufficiently accurate for the present purposes may be obtained from any chemical supply house at a cost not exceeding $75.

BEAKERS.

Two or three "nests" of these should be obtained, as they are not expensive.

A CHEMICAL BALANCE.

BOTTLES.

A dozen or more wide mouthed bottles should be procured for use in collecting and keeping samples and reagents. Six or eight ounce is a convenient size. Several large bottles of a gallon or so capacity will be needed for standard solutions. Those in which pure acids and ammonia are sold may be used. Two or three bottles for indicators will also be needed. They may be purchased or easily made by sticking an ordinary fountain pen filler through the cork, so as to permit of the indicator being added drop by drop.

type. They may be obtained from any supply house at slight cost, and preferably two or even three should be gotten. This number will not only eliminate the necessity of thoroughly cleaning the burette and changing solutions every time a different test is made, but it will also prevent delay and inconvenience in case one gets broken.

BURETTE HOLDER.

Some form of burette holder will be needed. This

SOME VARIETIES OF BOTTLES.

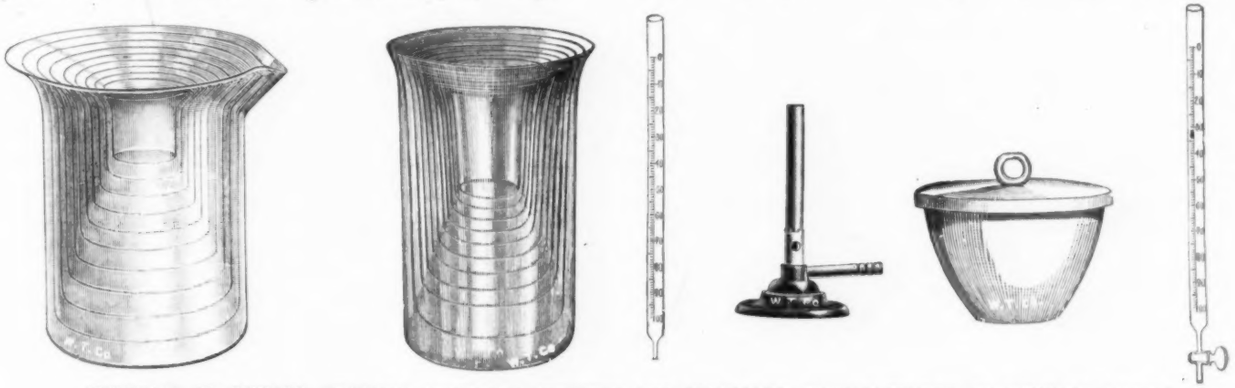
may be made by any one possessing a little ingenuity, but I would suggest that a ring stand, with three or four rings and two clamps, be bought. This will then give a means of supporting beakers and other vessels while they are being heated.

BURNER.

A Bunsen burner or alcohol lamp will be needed for heating solutions and for various odd uses.

CRUCIBLES.

These are made of porcelain or platinum, and are mainly employed for burning off precipitates, or in



CHEMICAL GLASSWARE, BEAKERS, BURETTES, BURNERS AND CRUCIBLES, MANUFACTURED BY WHITALL TATUM COMPANY, NEW YORK.

BURETTES.

These are long tubes graduated in cubic centimeters and provided with a glass stop cock, so that any desired quantity of liquid may be easily drawn off. Instead of a stop cock some forms of this instrument are fitted with a short piece of soft rubber tubing, into which a bit of glass tubing drawn down to a fine bore is inserted. The flow of liquid is then controlled by a small metal clip, which presses the walls of the rubber tube together, but may be opened by gentle pressure with the fingers. The latter form of burette is somewhat cheaper, but has certain disadvantages, so that it is better, on the whole, to purchase the other

other cases where it is desired to heat any substance to a very high temperature. The ordinary porcelain crucible is about 1½ inches in diameter and this is the most convenient size to get. They are very cheap. A form of porcelain crucible known as the Gooch crucible is widely used and a few should be obtained. They differ from the other kinds mainly in having a bottom perforated with many small holes. Directions for use will be given later on. They can be used small porcelain crucible is generally useless after being over and over again almost indefinitely, whereas the used two or three times.

(To be continued.)

FELT WHEELS

Some Interesting Information About This Important Adjunct to the Polishing Industry.

By Walter C. Gold.*

It was a "red letter" day for the industry of metal polishing when the solid felt wheel was conceived. As nearly as can be learned the first practical solid felt wheel was manufactured in the year 1876, since which time their use has steadily increased.

PROCESS OF MANUFACTURE.

Many are under the impression that felt wheels contain a "bond" or binding material. Such is not the case. Felt wheels are what might be termed a homogeneous product, as will be indicated by the following necessarily brief description of their manufacture: When taken from the sacks the wool is found to contain a great deal of dirt and foreign material incidental to the region from whence it came. It is first thoroughly scoured and then transferred to the picking machine which "opens it up," as it were; also assists in further cleansing it. A small percentage of oil is then applied to the wool in the oil machine, which treatment facilitates its passage through the important carding machines; it also relieves the wool of considerable "electricity," an excess of which makes the wool very difficult to handle, especially in cold weather. The wool then passes through the large carding machines from whence it emerges in loosely packed sheets which are wound into large rolls. This carding operation is of prime importance because the quality of the wheel and its truth depends largely upon the proper action of this machine. The sheets are then cut into circles, the diameter depending upon the sizes of the felt wheels to be made. One would never then recognize, for instance, a finished 12 x 2 wheel, because these proposed diameters are from two to three times the diameter and thickness of the finished wheel, the reduction in size being occasioned by a shrinking process later referred to. The cut wheel is then "hardened" by a special apparatus. This holds the wool together and enables it to withstand the strenuous action of the "fulling" machines.

The wheels are put through the all-important fulling or shrinking machines by batches, the solidity and texture of the wheel very greatly counting upon this portion of the process of manufacture. These fulling machines are large and powerful and exert tremendous pressure and have a peculiar and characteristic action which is, practically, a kneading and a shrinking one. While this action (which lasts from 6 to 8 hours) is in progress, steam is introduced through the felt mass, keeping them soft during this process, the whole process working the wool together with a resultant uniform texture of wheel. The wheels now have about the diameter originally designed for them and they are taken and thoroughly rinsed in several changes of water and then placed in the dry-house. From there they are placed under hydraulic presses which parallel the two flat sides.

The wheels are now ready for the finishing department where they are placed under a sandpapering machine which revolves at 4,000 r. p. m. This process cleanses and smooths the wheels. From the sand-papering machines the wheels go to the drill press and the holes are then cut in with a special cutting machine. Then they go to the lathe, where they are finally trued and tested for balance; and the wheels are finally tested for strength at speeds varying according to the diameters and widths. All these various processes take from ten days to two weeks, according to the diameters and thicknesses of the wheels (the thicker the wheel the longer it takes to dry) and the status of the weather, a season of damp or wet weather materially retarding the process of drying. The finished wheels are also affected by the weather as the wheels readily absorb moisture from the atmosphere.

THE FINISHED PRODUCT.

The felt wheel of today is a radically different article than that produced a quarter century ago. Then complaints from the user were frequent and annoying. The complaint was generally either that of "swelling," "bulging" or one of "burning," with its consequent holes or recesses. But the wheel makers kept up their courage and makers of good felt wheels have today practically no complaints.

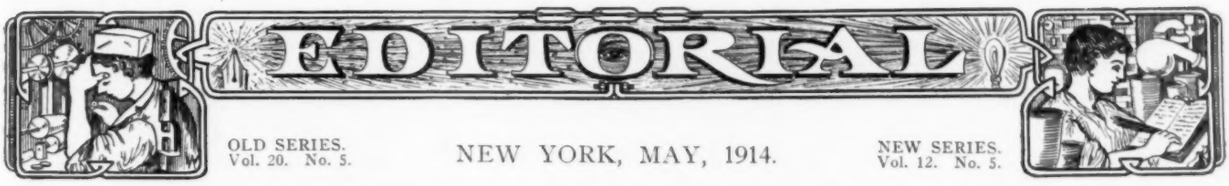
Felt wheels are called Spanish, French and Mexican. It is supposed that these names originated from the wool source of supply. Now, however, they are simply "trade names" or terms to designate the several qualities and colors. The wools now come principally from the States of Texas, Colorado, Utah, California and other Western points. We are no longer compelled to depend upon foreign countries. The Spanish felt wheels are white in color; the French gray, and the Mexican a reddish brown. The Spanish is made from a fine grade of wool, the French from a somewhat coarser grade of stock and the Mexican from a still lower grade. All are produced in five degrees of hardness, viz.: Extra soft, soft, regular hard, hard and rock-hard.

USE OF FELT WHEELS.

Felt wheels are now being used in the preparation of all metals for plating and for polishing and, being resilient, they can be used with a variety of shapes of face-square, round, beveled, etc., in fact, the face can be turned to agree with a sketch, should it accompany an order. Cut glass makers are also extensive users of felt wheels using the Spanish for putty work and French with pumice stone. The "Foot" wheel is absolutely free from "sizing," a material worked into the wheels by unscrupulous manufacturers while in process of manufacture in order to give them weight. Such wheels are costly, as the consumer readily perceives.

Such progress has been made in the manufacture of felt wheels that the cost to the consumer has been greatly lessened. The writer well remembers that twenty years ago they were being sold, retail, at $3 per pound for the Spanish and $2.50 per pound for the French, and it can be safely asserted that the felt wheel of that day could not compare with the best of the felt wheels of the present. To be sure, the consumption of two decades ago was very much smaller than now, and it is predicted by leading authorities that the consumption will materially increase because felt wheels are an indispensable article; there is no wheel about the polishing shop which can be used for such a variety of polishing. They have that desirable and essential property of resiliency which makes them the "general use" wheel.

*Of the firm of Walter C. Gold, Philadelphia, Pa.



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THE METAL INDUSTRY

With Which are Incorporated
THE ALUMINUM WORLD, COPPER AND BRASS,
THE BRASS FOUNDER AND FINISHER
AND ELECTRO-PLATERS' REVIEW.

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BRASS FOUNDER'S AGUE

Brass founder's ague, or "spelter shakes," is peculiar to one branch of the brass industry—the melting, moulding or founding of brass—and is due to the incessant inhalation of metallic fumes. The disease, if it may be called such, dates back for a great many years, but has always been more or less of a trade secret. In 1832 an Englishman named Thackray stated that brass founders, or all who were exposed to the inhalation of brass fumes, were liable to a malaria-like sickness evinced as chills, fever and sweats. The fact that persons rarely died from the disease itself or were not killed at once or within a few months, or years, has kept the knowledge of it from the public in general and from the average physician. It is simply a predisposing affliction which of itself does not kill, does not require the services of a doctor, but paves the way for the chronic diseases which later prove fatal.

We have lately seen it stated that it was the practice of a certain well-known brass caster who, when he "felt" the chills coming on, to drink a large quantity of sweet milk. While this may be effective in an individual case, we do not believe it by any means to be general. We do not believe from an experience of twelve years that there is any good reliable preventative for "spelter shakes" short of avoiding the breathing of zinc fume. The secret of freedom from spelter shakes in the casting shop is good ventilation and consequent pure air. We touched upon this subject in an editorial, "Dangers of the Casting Shop," in THE METAL INDUSTRY for April, 1910. We stated then that one of the important contributing causes for "spelter shakes" was the eating of food in an ill-ventilated shop.

No matter how much whiskey, milk, coffee or other so-called "remedy" a man may take, it will not positively *prevent* an attack of the shakes if the fumes are persistently breathed. On the other hand, there does not seem to have been discovered anything that will check an attack when once it has started but sleep and rest. In the great brass casting district of Connecticut, the Naugatuck Valley, it has been considered for years that a good, stiff dose of Jamaica ginger does about as much good as anything known in lessening the effect of the shakes. A common idea has existed in the past among brass founders and is still in force today in some localities that alcohol is a great help. This is absolutely wrong, for it has been our experience that the topers were more severe sufferers than the total abstainers. The alcohol, on the other hand, runs down the system and renders a person more susceptible to attacks,

and sends him on his way to the common end of the drinking caster—consumption and pneumonia.

Brass chills usually attack the new-comer in the shop during the first few days of his work, though we have known casters and moulders who never had them. Also if a man has not been in the shop for some time and then goes back, he is almost sure to have an attack. There is usually no warning given when the chills are about to come on, so it seems to us that it would be difficult to be able to take something to ward them off. The chill might start when on the way home, and more often it would come in earnest when ready for bed. In contrast to this we have seen men attacked in the shop when in the middle of the day's work. The chill starts suddenly, the body shakes, the teeth chatter and the knees grow weak. Violent cramps attack the legs, the blood goes from the face and vomiting sometimes ensues, but not always. The throat is dry and parched with an irritating cough, and there is a feeling of weight and constriction in the chest. Next comes a fever period, followed by a most profuse sweating, which causes a sensation of great relief. The patient then falls into a deep sleep and wakens the next morning with no appetite, rather weak and irritable in temper, but able to work.

Dr. E. B. Hayhurst, in a report made in connection with investigations conducted by the Illinois Commission on Occupational Diseases made the following summary regarding brass ague:

> The results of the investigation fall under four heads: (1) The workman, before he has reached the middle of his prime of life, finds that he can "no longer stand the brass fumes," because of one complaint or another, quits his trade and becomes a common laborer. This is the best that may happen to him. It prolongs his days, but leaves him too old to learn a new trade, quenches whatever life ambitions he had, and with a deteriorated health he passes on. (2) Tradition tells him that whiskey is the best remedy known for brass chills—it "cuts the scales out of dry parched throats," "it even prevents brass chills." All brass workers have a peculiar right therefore to imbibe whiskey or other strong alcoholic beverages. Thus, early, the weaker-minded men have become chronic alcoholics, soon lose their jobs, and are thrown upon the community. (3) The constant breathing of the poisonous brass fumes and the repeated brass chills gradually undermine some vital organ or system and the workman's life is suddenly brought to a fatal termination by pneumonia, nephritis, liver disease, gastritis, or nervous affliction. (4) If the workman is fortunate enough to escape the first three calamities, statistics show that somewhere between the ages of thirty-five and forty-five (perhaps fifty) his gradually assertive bronchitis becomes an intractable asthma. Then he consults a physician and finds he is well within the clutches of consumption.

The present rate of mortality of the brass foundryman is two and one-half times that of the farmer. Respiratory diseases, particularly consumption, account for the difference. Comparative tables based on sickness and invalidism, if obtainable, would show even greater differences.

It is surprising how many divisions of the metallic arts are concerned with brass founding. Besides the great brass mills and jobbing shops which make all manner of non-ferrous alloys (and all center around the brass-pot), there are manufacturers of plumbing supplies, chandeliers, steam valves, soda-fountain supplies and various other specialties, smelters and refiners of both crude ores and scrap metal, and finally the immense railroad plants and supply firms which are concerned in the making of journal bearings for cars.

There is no cure for brass chills. But they can be prevented by striking at the cause. For such an important industry not to do so is like tolerating small-pox in a modern community. The workmen must be protected from the breathing in of brass fumes and foundry smoke. In large foundries with good ventilation, either natural or artificial, brass chills practically never occur.

PEACE VS. WAR

As we go to press a disturber of the peace of mind of the American people and of the prosperity of the business world is the possibility of a war with Mexico, and war or no war, the wisest man in the United States does not seem to have a definite idea of how the troublesome Mexican question will be settled. As war is a relic of barbarism it is a means of action which civilized nations seek to avoid and it would surely seem that in this twentieth century of progress the differences of nations could be adjusted like the differences of individuals—in the Courts of Justice. We believe that all thinking men will hope that the proffered and accepted mediation between the United States and Mexico will be successful and avert the horror of horrors—WAR.

In case, however, that the South American mediation does not prevail there is already some speculation upon the probable effect of war upon business. The case is cited of how, at the time of the war with Spain in 1898, the spending of vast sums of government money had such a stimulating effect on business which at that time had undergone a number of years' of stagnation. It is stated that heavy war investments of the government would again give to industry the stimulation which it at present very much needs.

Surely many branches of the metal industry would be benefited from the buying of immense quantities of war material, especially the cartridge industry, which is said to be the largest single consumer of brass, to say nothing of the allied brass and industrial arts which would prosper under government orders.

But, of course, it is much better for the permanent good of the nation that our industries should flourish under the Dove of Peace, not under the God of War, and every man who has the interest of his country at heart would forego the temporary rush of war business and would welcome the steady tide of peaceful prosperity. At any rate the whole nation would then be exempt from the payment of war taxes and life pensions, and, what is the greatest consequence, stop the sacrifice of valuable lives.

Therefore we will hope that mediation between the United States and Mexico will be successful and that an example will be given to the world of how neighboring nations may adjust their differences without having to resort to legalized murder.

PLATING COSTS

To the Editor of The Metal Industry:

In reply to Mr. Percy S. Brown's criticism in the April number of The Metal Industry, regarding my article entitled "Side Lights on Plating Costs," I would say that when he claims an anode efficiency of 50 per cent in the old fashioned metal solution (¾ of a pound of the double sulphate of nickel and ammonia to the gallon of water) he is no doubt doing it with mental reservation, as when his article of a few years ago published in The Metal Industry, he reported hat he successfully made and ran a single nickel salt solution, but on cross-questioning he admitted that in addition to the single nickel salt he had used considerable chloride of soda. In all probability he would admit now, if questioned, that the solution he had in mind contained other chemicals besides the double nickel salts.

Further touching on this subject, the writer within the last ten days met a manufacturer who had been trying a rapid plating salt and had thrown it out, as he claimed it used his anodes too fast. Most all platers, at least the old-timers, can remember manufacturers going up in the air whenever they were told to order new anodes, considering it far cheaper to get the nickel from the salts than from the anodes. As to the purity of the salts, it is quite possible that the dealers have refrained from sending anything but the purest of salts to those factories where it is known that chemists are employed.

Now a word as to gaining cost as mentioned in the original article.* This system is being used in some of the silverware shops who rely upon the ammeter entirely in getting a predetermined weight of deposit. With silver costing 56 cents per ounce in the factory in question, it was found that the actual cost of the plating, including labor, acids, potashes, brushes, pumice stone, cyanide, etc., but not including power, belts, oil or overhead charges, per ounce of silver deposited was $1.248, or $0.0026 per grain; as this was on white metal, the batches running 20 minutes at 20 amperes, giving 400 grains to the batch, eight coffee pots constituting a batch, this figured 50 grains per pot, which at $0.0026 is $0.13 actual cost per pot. The creams being smaller, sixteen constitutes a batch. This gives a deposit of 25 grains each, or a cost of $0.07½ per cream, other things in proportion. This of course did not take in the scratch brushing or polishing, tripoling or anything of that nature, but merely the actual work connected with the plating. Of course in job work this scheme would not be applicable, but in the straight manufacturing line it is working satisfactorily today, and has been for several years.

Now, admitting that in the nickel plating the cost of the metal is much less, not only in direct cost, but proportionately to the cost of labor, the fact remains that the ratio between the amount of metal deposited and the time of preparing same (not including polishing or buffing) on identical pieces or pieces of a similar nature remains constant.

As an example, in a factory visited by the writer within the last few months, there were two nickel tanks running, both on the middle point of the switch, both containing same amount of anodes, the same amount of work and solution showing the same on the hydrometer. These batches were run for 35 minutes, labor cost in the plating room amounting to $6 per day. The output being 1,500 pieces per day from the two tanks. The writer borrowed an ammeter to demonstrate a point in a friendly argument with the proprietor and found that the first batch, running at 60 amperes, which at 35 minutes' run averaged 10 grains of nickel apiece on the articles plated (these being all the same). The second tank showed 90 amperes, or 15 grains apiece, which was 50 per cent. more than the first tank. Of course the pieces at the end of the rods were receiving a little heavier plate than those in the center of the tank.

Now, allowing that half of the labor was expended on each tank, both in the actual plating and in the preparing of the same, you would have $3 labor as against 7,500 grains of nickel deposited for the first tank, while on the second tank you would have $3 for labor as against 11,250 grains. This shows quite a discrepancy in the unit taken in figuring the cost by this method, but a practical plater will readily say that this is not the fault of the system, but a fault of the amount of current used.

I should like to hear from some of the old-time platers regarding the amount of nickel taken from the anodes in the old-fashioned solutions, not only in their own experiences, but in cases that they have come across where anodes have lasted for years. I think it would make interesting reading. While on this subject the writer would like to say that within a week or so his attention was called to a set of anodes in an old-fashioned solution, that were being used up very rapidly, but instead of the nickel entering into the solution it seemed to be going to the bottom in very finely divided metallic nickel. In appearance it was as though each atom of nickel were oxidized and while, when the anode was new it appeared in good condition, yet under action of the current there seemed to be no cohesion. Possibly Mr. Brown or some other writer may have run across this or similar phenomenon. If so, I should like to hear their explanation.

Chas. S. Barbour, Jr.

Cleveland, Ohio, April 20, 1914.

*The Metal Industry, April, 1914.

BEARING METALS

To the Editor of the Metal Industry:

Referring to the remarks made by Mr. Gleason* in criticism on my article on copper-lead alloys in the March issue of The Metal Industry, I will say that when I wrote the article it was without any desire to be personal or to take up any argument with Mr. Gleason. My object was to show that if any credit was due for the discovery of the method I ought to get it, regardless of the fact that patents were granted, which shut me out from any glory, if proven to be any value to the world.

Mr. Gleason gets very sarcastic in his remarks, and says that if I would look up some back issues of The Metal Industry and follow the controversy between the Ajax Metal Company and Andrew Allan, Jr., I might get some enlightment as to what has been going on in the East regarding lead-copper alloys.

For Mr. Gleason's benefit I will say that I read all the articles published in The Metal Industry, some of which appeared long before I sent my first samples in March, 1910, and it was through the reading of the controversy between Mr. Clamer and Mr. Allan, in which Mr. Allan mentioned that he had first to see a strictly copper-lead alloy, made other than by him, that led me to send the samples, to prove that I could control the lead in copper in any quantity, but at that time I thought little of it as a bearing metal.

Mr. Gleason says he has only been a subscriber to The Metal Industry for two years, hence he did not see my articles, yet he recommends me to read this controversy, which appeared at times some two years previous to his information, which, according to his own words, would make my head swim.

I did not put the metal mentioned on the market, nor have I yet. I am still experimenting. Neither did I try to patent

*The Metal Industry, April, 1914.

my methods, not having the money, nor the confidence in patents of that nature, and still hold that to issue patents on any particular mixture of metal is wrong.

No patent is valid until passed on by the U. S. Supreme Court, and if I had the capital and wished to employ the method of controlling the lead in copper with the aid of galena, I would do so and if Mr. Gleason wanted to fight it, that would be his privilege. It would take years of fighting, and no end of money, more than he could possibly make on the sale of the metal during his lifetime. That is one reason I did not try to patent my ideas. My sole desire was to save up enough money, working at the metal trade, until such a time as I could put my metals on the market, under trade-mark brands. Once having proven their worth and established a reputation for them, no matter who made a metal similar, it would be hard to take the business from me.

Work and try as I could I was unable to locate for myself. I resigned my position as foreman with the John Finn Metal Works February 1, with a view of getting some one interested with me. My plans as arranged failed, hence I am without employment, and facilities to further experiment with my metals, otherwise I would cast a sleeve, as Mr. Gleason suggests, and have samples tested from same. I am not a chemist and do not know the first thing about assaying and my remarks were not made with any thought against the profession. I simply made the statement that no two chemists would discover my methods, even if the ingredients could be analyzed perfectly by them. I often found in sending out samples of my metals that firms had them analyzed and sent reports to me of what they contained and some of the tests contained as many varieties of metals as Heinz's factory does of pickles.

I said in my letter that I did not use any metal besides lead and copper, and that I could control the lead in any quantity, but will take part of that back, and say that one of my mixtures contains silica, if that would be classed as a metal. That was the reason for using sulphide of lead (galena) to get the silica which it contained. In defense of my theories would like to quote a paragraph which appears in the April issue of THE METAL INDUSTRY, entitled "Unprotective Patent Laws," which says in part: "The Iron Age in commenting on the advice given the other day by Orville Wright that any inventor should completely withhold all knowledge of his invention from the public and from the Patent Office as well until he has a backing of at least $200,000" (see page 165).

In closing would like to ask Mr. Gleason how he could tell whether I used galena or not? I can control and hold the lead up by three different methods, at least I have made castings in ingots that looked perfect; perhaps after I have them tested out under running conditions I may be wrong. At any rate, I have great hopes in copper-lead alloys for bearing purposes and ring packing, no matter who made it.

A. P. WRIGHT.

Berkeley, Cal., April 20, 1914.

SELF-SKIMMING CRUCIBLE

TO THE EDITOR OF THE METAL INDUSTRY:

We notice in your issue for April that the Ross-Tacony Crucible Company rather take exception to the article which you printed some time ago headed "A New Crucible," wherein it was said that the illustration which you showed was of a new crucible which had been evolved by Henry Weisbrodt, an employee of the Joseph Dixon Crucible Company. The Ross-Tacony Crucible Company in their letter to you say that the idea is not a new one, as they have been making what they know as a bottom-pour crucible for years, "the only difference is we have an inner tube, which takes the metal from the bottom of the pot and everything is absolutely free from any skimmings." All this is quite true and the Dixon company, as well as other companies, have been making what is known to the trade as the bottom-pour crucible for a number of years, but the new crucible referred to is so much of an improvement over the old-time bottom-pour crucible it may well be considered as new.

We have found that in actual service users will often completely empty the crucible, in which case some of the dross remaining on the top of the crucible may become lodged in the long inner tube. The new pattern renders the removal of this dross a very easy matter, and, furthermore, it is less likely to become clogged. Mr. Ross's criticism of the crucible "that unless the pot is full of metal it is bound to get some of the dirt in it" is not true, because the orifice is always covered by the upper surface of the metal, and it is, in effect, a bottom-pour crucible in that the metal as it leaves the crucible does not come from the surface.

The important point in either type of crucible is that the very upper surface of the metal is not poured. Our new pattern does this just as well as the old pattern referred to. Furthermore, its construction reduces very little the capacity of the crucible, and it is a very much easier and safer crucible to manufacture. Furthermore, we have had instances where fluxing material lying on the surface of the metal has cut through the wall of the inner tube and thus, in effect, making it more of the type of our improved crucibles.

JOSEPH DIXON CRUCIBLE COMPANY.

Jersey City, N. J., April 15, 1914.

FLUID COMPRESSED SEAMLESS TUBES

TO THE EDITOR OF THE METAL INDUSTRY:

In the April issue of your interesting journal, which came to hand today, I notice an article with illustrations relative to a new process for making tubes and rolls. I beg to advise you that such process was used in England, prior to 1885, by Messrs. Whitley Partners, Leeds, England, for the manufacture of paper mill rolls, and with complete success. At that time they cast rolls weighing upwards of 5,000 pounds, and they were making them as late as three years ago. The writer, in 1894, used this process for the manufacture of light brass or yellow metal shells, which were then rolled out, slit spirally and the resultant slit metal drawn into wire. This was in the days when brass wire was made by the slitting method and in short lengths. The writer made extraordinarily long lengths, but shortly after the present methods of making wire came in and the shell process had to take a back seat and was dropped.

This shows once more that there is a lot of truth in the old adage "There is nothing new under the sun." B. MORGAN.

Newport, R. I., April 11, 1914.

AN ABSTRACT

THE FORMATION OF ALLOYS BY COMPRESSION OF POWDERED METALS.*

Alloys are actually obtained as is known by the fusion of two or more metals. In cooling these metals crystallize only, or after they have been combined with one another. Certain investigators have endeavored to manufacture, if possible, the alloys by the compression of the metals in the form of powder, filings, etc. Prior to 1882, W. Spring had shown that the powdered metals which compose the alloys of Rose and Wood when compressed under a pressure of 5000 atmospheres gave a mass which at the point of fusion differ but little from that alloy obtained by the ordinary method. In 1888 Halleck showed that the simple mixture at ordinary pressure gives a composition more fusible than the most fusible of either metal constituent.

Spring has been able to obtain by the compression of powdered zinc and copper a kind of brass, but richer than the ordinary alloy. More recently this work has been resumed by Mr. Masing. At 4000 atmospheres he verified the statement that the mixed filings of two metals no longer gives neither a chemical combination nor a mixture of crystals.

The microscopical examination shows all kinds of metals to be absolutely distinct (the chemical combinations and the mixed crystals which characterize the alloys obtained by the fusion process). But if afterward, the conglamerate mass thus obtained is heated below the fusion point of the more fusible one of the two metals, there is obtained a mass more coherent, resembling rather obviously the composition of the veritable alloy; that is to say, its texture shows the mixed crystals very clearly.—C. P. K.

*From Le Mois Scientifique et Industriel.

Shop Problems

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY.

ALLOYING

Q.—We are particularly interested in finding a cheap non-corrosive metal alloy. Can you give us a few different alloys which would cover a metal of this nature?

A.—The following alloy is very hard and strong, but rather brittle:

Zinc	78
Tin	18
Copper	4

Another alloy that has great tensile strength and casts well, is:

Zinc	85
Copper	10
Aluminum	5

Magnalium (aluminum, 92, and magnesium, 8) is now being successfully used by a number of manufacturers. It is light and strong, but the melting loss is large and much trouble is usually experienced before the founder is able to obtain bright clean castings, free from "black spots." When its gravity is considered (2.5) magnalium is not so expensive and after one has learned to handle it, it is the most satisfactory of any of the light, non-corrosive alloys.—J. L. J. Problem 1,966.

ANALYZING

Q.—Can you suggest any simple test for analyzing the composition of German silver? We want to check the guarantee our suppliers give us to the effect that the metal with which they supply us contains 10 per cent. of nickel.

A.—There is no simple test that we could suggest for determining the degree of nickel in a German silver sample. A chemical analysis of the metal in question would have to be resorted to The best method to use for this determination that we could recommend was by means of the dimethylglyoxime as described in THE METAL INDUSTRY for September, 1913. Problem 1,967.

CASTING

Q.—I have a casting of the following composition, 75 per cent. aluminum, 22 per cent. zinc, and 3 per cent. copper, and am desirous of removing the zinc in such quantities and in such a manner as will produce a porous or honeycombed surface on the casting. I understand this can be accomplished by some electroplating or reverse plating process. Will be very grateful to you for any information you may be able to give me. If any plating process is used please give me the solution to be used, also the arrangement of the apparatus in general.

A.—We suggest that you prepare a solution of 10 parts of sulphuric acid and 90 parts of water and arrange as a plating solution with three poles or rods. The center rod should be connected with the positive current and the two outside rods connected with the negative current. For cathodes sheet carbon or aluminum may be used. The casting from which the zinc is to be removed will act as the anode. A current of three or four volts should readily remove the zinc from the metal giving you the results desired in a very short time. If the action should appear to be slow add a ½-pound of sulphate of soda to each gallon of solution prepared. This method is just the reverse of plating, so care should be taken to have the current properly reversed when connections are made.—C. H. P. Problem 1,968.

COLORING

Q. Can you give us a formula for coloring polished aluminum without heat or varnish?

A.—To color aluminum cleanse the metal after polishing; then immerse in a solution consisting of the following proportions. This formula will give a deposit of copper by immersion.

Sulphate of copper	30 parts by weight
Potassium bitarate	30 " " "
Sodium carbonate	25 " " "
Water	1,000 pounds

After coppering immerse in dilute solutions of potassium sulphide or barium sulphide to produce brown or black tones.—C. H. P. Problem 1,969.

DEPOSITING

Q.—Could you oblige us by giving the best method of depositing on papier-maché articles an absolutely smooth surface of copper.

A.—To produce a smooth copper surface upon papier-maché the method that is usually used is as follows:

Coat the surface with orange shellac to which is added venice turpentine to prevent drying too rapidly; then, while tacky, brush over with platers' copper bronze powder. When dry brush off the excess with a soft brush; then immerse in a silver dip consisting of ½-ounce of silver chloride and 3 ounces of cyanide of potassium in 1 gallon of water. This will give a silver appearance to the bronze powder; then wash in water and plate in the regular acid copper solution consisting of the following:

Sulphate of copper	1¾ pounds
Sulphuric acid	4 ounces
Black molasses	¼ ounce
Water	1 gallon

Use from ½ to 1 volt pressure.

Another method that has been recently adopted is to coat the surface of the papier-maché with a solution of potassium iodide. When this becomes thoroughly dry plate direct in the acid copper bath.—C. H. P. Problem 1,970.

DIPPING

Q.—We have tried the following solutions to take the fire out of sterling silver, but up to the present time we have been unsuccessful. We tried one part of nitric acid and four parts of water, also, one part of nitric acid and one part of water, both hot and cold solutions, but were unable to get results.

A.—A method that is being used very satisfactorily for removing fire from sterling silver is as follows:

Prepare a solution of cyanide of potassium or sodium in water until it stands 10 to 15 degs. Baumé. If possible use a small iron tank for the purpose and arrange as a plating tank, using a reversed current, that is, connect the tank with the negative pole and the silver to remove the fire to the positive pole. Or if a wooden tank is used for the purpose sheets of steel should be connected with the negative pole.

As fast as the silver is annealed it should be immersed in the cyanide and then removed and washed. If the fire is not entirely removed connect to the positive pole for a second or two and the fire will be withdrawn from the surface into the solution. Use a very strong current. The cyanide of silver formed in the solution is frequently used for replenishing silver striking solutions or may be recovered and sold as a residue.—C. H. P. Problem 1,971.

FINISHING

Q.—Kindly advise how to obtain an oxidized finish on German silver.

A.—To produce an oxidized tone without plating upon German silver prepare a solution of the following:

Hyposulphite of soda	8 ounces
Acetate of lead	4 ounces
Water	1 gallon

Use the solution hot and immerse the German silver articles in the solution until a gun metal appearance is produced.

A similar tone can also be produced by dissolving powdered white arsenic in muriatic acid by the aid of heat; then add 2 to 4 ounces of the mixture to each gallon of boiling water. Immerse the article in the mixture until uniformly coated.—C. H. P. Problem 1,972.

LUBRICATING

Q.—We noticed in the February issue of THE METAL INDUSTRY under "Shop Problems," a formula for a lubricant for use on brass faucets and valves. What we would like to know is whether it would be practical for us to use this same lubricant on gas cocks.

A.—The same lubricant could be used on small gas cocks, but there is another formula which is more practical. The grease or lubricant used on gas cocks or swing joints should not contain resin, paraffin, rubber or similar substances. When the cocks are exposed to heat, as in the case of a by-pass cock over an inverted incandescent lamp, the grease or lubricant should be made of a good quality gas engine cylinder oil and graphite, in proportions of one pound of graphite to one pint of oil. This grease can be used on all kinds and styles of cocks.

Another satisfactory lubricant that can be used in place of the one given above is made of pure beeswax and a good quality of tallow lard, in about the proportions of 3 parts of beeswax to 2½ parts of tallow or lard. It is recommended that a small quantity of gas engine cylinder oil be added to make the grease thinner and more easily and economically applied.—P. W. B. Problem 1,973.

MIXING

Q.—We shall be obliged if you can say what deleterious results may be expected from a very small percentage of "foreign" metals in ordinary mixtures of copper, tin, zinc and lead. What would be the altered appearance and evidence of unsoundness if aluminum, manganese or nickel get into the mixture undesignedly?

A.—Aluminum gives brass alloys a characteristic bright surface, but renders them drossy and unsuited for valves or work that must stand a pressure test or dip bright. Manganese in small amounts is beneficial to all brass mixtures, but excess of it makes drossy metal. A small amount of nickel does no harm except to make the metal less fluid. Iron is very detrimental, as it produces hard spots and black colored work.—J. L. J. Problem 1,974.

POLISHING

Q.—Will you kindly give me the following information?

1. How are polishing clothes prepared which are found on the market for cleaning gold and silver ware?

2. Kindly give me a formula for a liquid non-inflammable metal polish for brass.

A.—1. Polishing cloths are prepared by mixing rotten stone with oleic acid to a fluid paint-like consistency; then the cloths are immersed in the fluid and the excess removed by a wringer similar to the ones used in wringing clothes. Oleic acid is an oily substance similar to neatsfoot oil.

2. A non-inflammable metal polish can be prepared by mixing 3 parts of tetra chloride to 1 part of benzine, in mixing upon a pint basis. Use about the following proportions:

Tetra chloride and benzine mixture....	12 ounces
Powdered silex	480 grains
Oleic acid	40 drops
Powdered rosin	10 grains

These are approximate proportions and may be changed slightly to suit conditions.—C. H. P. Problem 1,975.

PLATING

Q.—Would you please inform me how to make a steel plating solution? It must be a harder deposit than nickel plate, as I want to put one, two and three thousandths plate on my work.

A.—For your purpose, the following formula for electro deposition of iron given by a German authority should give you the desired results.

Water	1 gallon
Sulphate of iron (Ferrous sulphate)	5 pounds
Sulphuric acid	⅛ ounce

The temperature of the solution should be 150 degrees, the current strength about 20 amperes per square foot of surface.

The hydrogen gas which forms upon the deposit should be removed by blowing compressed air into the solution. This prevents holes in the surface of the deposit, preventing the hydrogen from becoming occluded which would be liable to occur in a still solution. If air pressure cannot be used, then the author claims to have obtained the same results by covering the surface of the solution with paraffin oil.

A solution that is used cold and gives excellent results is as follows:

Sulphate of iron and ammonia	1¾ pounds
Water	1 gallon

Use anodes in either solution of mild steel plated. The anode surface should always exceed the cathode surface and use a voltage of from 1 to 1½ volts at the terminal of the bath. Use air or paraffin oil as above mentioned.—C. H. P. Problem 1,976.

Q.—Could you advise me as to a tin-plating vat. It is used largely for plating on ordinary tin plate which invariably shows an etched crystallized surface when put straight into the vat. If a thin covering of brass or copper is first given the etching does not appear, but this precaution is clumsy and takes time. The vat is worked with tin salts, American ash and bitartrate of potash at about 180 degs. Fahr. Could you also tell me the function of the bitartrate in the solution?

A.—We would refer you to a recent article entitled "Tinning Articles of Brass, Bronze, Iron and Steel," which appeared in the February, 1914, issue of THE METAL INDUSTRY.

The function of bitartrate of potassium in a tin solution is to prevent the formation of a spongy deposit, but when used in connection with soda ask we think its action is entirely annulled by the neutralizing effect of the soda upon the acid incorporated with the bitartrate. A little cyanide added to the tin soda ash solution will probably give better results and cover the crystallized surface more readily.—C. H. P. Problem 1,977.

REFINING

Q.—Will you kindly advise what is the best method of purifying old scrap lead, so as to make it soft like virgin lead?

A.—Old scrap lead is best purified by melting in an iron kettle and then boiling up with short lengths of hickory or other hard wood so as to remove the dross from the lead. The dross can only be reduced by hard coal and fluor spar in a reverberatory or blast furnace. After purifying your scrap lead make an assay of it. If it contains tin use it for making solder, and if it contains antimony or antimony and tin use it for making babbitt.—J. L. J. Problem 1,978.

SOLDERING

Q.—Pleased to give me some information on the soldering of ice cans that are badly corroded in the seams. I wish to get a process which will eat the dirt out of the seam and tin without any scraping.

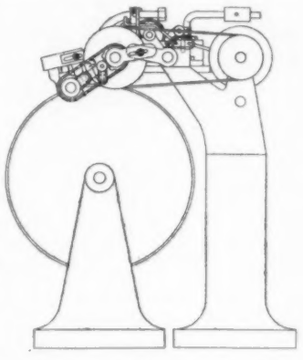
A.—As you are no doubt aware the success of any soldering method depends upon a clean metal surface free from corrosion or oxidization. We presume your difficulty lies in the rust that develops in the seams from moisture and we suggest that the regular chloride of zinc soldering fluid be mixed with muriatic acid in the proportion of 2 parts fluid and 1 part acid. Coat the seams with the fluid by acid of a brush, then allow the fluid to dissolve the rust and then wipe away the excess and solder in the regular manner. If the action of the fluid is too slow in removing the rust or corrosion add a little more muriatic acid to increase its dissolving action. This should not require more than five minutes time to cleanse the surface.—C. H. P. Problem 1,979.

PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

1,091,489. March 31, 1914. **Grinding and Polishing Machine.** N. J. Downey, Wallingford, and S. Kumkumian, Meriden, Conn.

This invention relates to improvements in grinding and polishing machines, and the object of the improvement is to produce a machine, shown in cut, that will automatically grind and polish solid handles for cutlery and similar articles and that will do this in a manner that is substantially similar to the manner that these operations are successfully performed by hand.



The patent covers: A grinding machine comprising a driving pulley, a shaft on which the same is loosely mounted, a clutch connecting the said pulley and shaft, a spring tending to maintain the said clutch in the closed position, a main arm having a tilting movement, means for moving the said arm to and fro laterally, means for opening the said clutch comprising a tripping arm, and the said tripping arm being positioned suitable to be engaged by the said main arm when tilted to one position and at the end of the lateral movement thereof in one direction.

1,091,492. March 31, 1914. **Enamel.** H. G. Essayan, Boston, Mass.

This invention relates to enamel for metallic surfaces and my object is to provide an enamel which shall be elastic as distinguished from the brittle vitreous enamels in use today.

In preparing the improved enamel, which is an improvement on the well-known Niello enamel, the inventor melts together in a suitable vessel silver, preferably pure, copper, lead and sulphur, and after the mass has become molten, the heating is continued for a short time and the mixture continually stirred and all impurities that rise to the surface are skimmed off. The mixture is then allowed to cool, and after cooling is crushed. A certain portion is reduced to powder and the remainder, which is tough and soft, and which cannot be pulverized, is put back in the vessel and melted and stirred and skimmed as above set forth. After the resulting mass has cooled, it is again crushed and the soft tough portions separated from the pulverized part and re-heated, and the process is thereafter carried on through a total of seven or eight heatings until substantially the entire mass is reduced to powder.

In the manufacture of the improved enamel, the copper is melted first then the silver is added and then the lead, and finally, after the copper, silver and lead have been melted, the sulphur is put in.

1,091,542. March 31, 1914. **Metal Founding.** C. L. Spinney, Lynn, Mass. Assignor of General Electric Company, New York.

Certain metals, such as copper and silver, when fused absorb considerable gas such as air, or furnace gases. When the metal solidifies the gas forms blow holes and reduces the mechanical strength and electrical conductivity of the cast metal.

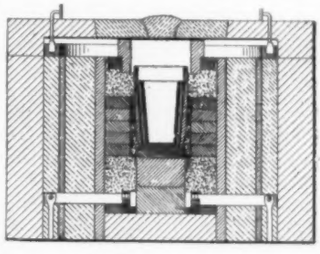
In accordance with the present invention sound castings of high electrical conductivity are produced by bringing the molten metal into contact with a comparatively large amount of a flux, such as boric anhydrid, in such a manner that the flux comes into thorough and intimate contact with the molten metal for a prolonged interval of time just prior to casting.

The inventor claims: The process of preparing copper for casting, which consists in bringing the same in a molten state in contact with a mixture of a flux comprising boric anhydrid and an inert material which will retain the anhydrid underneath the melted copper and feeding the anhydrid gradually into the melt and maintaining the same long enough in contact with the copper to effect a purification.

1,091,808. March 31, 1914. **Electric Crucible Furnace.** D. F. Calhane, Worcester, Mass.

This invention relates to an electric furnace suitable for very high temperatures.

The principal objects of the invention are to provide a convenient and inexpensive construction, as shown in cut, for this purpose in which the heat shall be concentrated along the walls of the crucible by forcing the current to flow in a restricted path therealong so as to increase the efficiency and the practicable limit of the working temperature; to provide means whereby this concentration can be caused to take place at any desired plane along the wall of the crucible and throughout any desired zone thereof; to provide a construction in which the current shall be caused to flow along the crucible walls without unduly heating the bottom; to provide for adjusting the support of the crucible and said concentrating means so that crucibles of different sizes can be used without altering the furnace; to employ an improved refractory material as the crucible support and means for concentrating the heat as set forth above; to provide improvements in efficiency of heat insulation, and to provide an improved form of concentric sets of crucibles nested together so that the furnace can be continuously operated for melting the charges of a plurality of crucibles without disturbing the carbon core of the furnace and without allowing it to cool down.



1,092,340. April 7, 1914. **Soldering and Welding Materials.** A. Cornaud and H. Van de Cruys, Brussels, Belgium.

The present invention relates to improvements in soldering and welding materials for aluminum, and it comprises an alloy of the four metals indicated below, which permits the soldering and welding operation to be carried out at relatively low temperatures.

The invention is illustrated by the following specific example, which shows one embodiment thereof, the four metals used in producing the alloy—zinc, aluminum, tin and nickel—being combined in substantially the following proportions:

52	parts	by	weight	of	pure	zinc
17.5	"	"	"	"	"	aluminum
30	"	"	"	"	"	Banca tin
0.5	"	"	"	"	"	nickel
100						

The nickel may be replaced by an equal amount of German silver (white copper).

The presence of the tin and nickel enables the solder to be melted at a lower temperature, and hence enables the soldering operation to be carried out at relatively low temperatures.

The solder is moreover very satisfactory in operation and adheres firmly to the places to which applied. The new composition or alloy can be used without acids or welding powders.

1,092,500. April 7, 1914. **Aluminum Alloy.** W. H. McAdams, Bay Shore, N. Y.

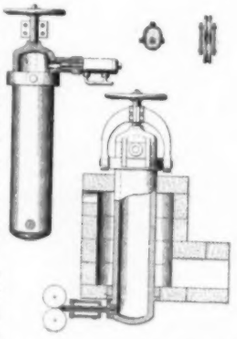
This invention relates to an aluminum alloy, with the object in view of providing an inexpensive alloy suitable for casting purposes, which will not tarnish and which will possess the qualities of great fluidity and strength.

With these ends in view, the invention consists in an alloy composed of aluminum, zinc, copper and silver in which the amount of zinc exceeds the amount of copper and the amount of aluminum exceeds the amount of zinc.

The aforesaid elements are preferably combined in the proportion of 70 parts by weight of aluminum, 26 parts by weight of zinc, 3 parts by weight of copper and 1 part by weight of silver.

1,092,934. April 14, 1914. **Process for Making Extruded Articles of Metal or Other Material.** Grenville Mellen, of East Orange, N. J., assignor of one-half to United Aluminum Ingot Company, New York.

This invention relates to a method of producing articles, such as plates, rods, angle bars, tubes, wire and similar products, which may be made from molten metal or other fluid or plastic material, contained in a receptacle and extruded through a die, the metal or other material congealing within the passage constituting the die, and being continuously removed therefrom; additional metal or plastic material being added to the receptacle from time to time, to permit the formation of articles of great length when desired. The cut shows an apparatus designed to carry out the invention, for which the inventor claims the following:



The process of forming extruded products, comprising maintaining a material molten in a closed chamber, injecting water under pressure into the chamber above the molten material, expanding the water to steam, maintaining the steam under substantially the same pressure as the water, and pressing the molten material through a die by the compressed steam.

The process of forming extruded metal products, comprising maintaining a material molten in a closed chamber, protecting the metal from oxidation by a covering of flux, injecting into the chamber above the metal a liquid under sufficient pressure to press the molten metal through a die, expanding the liquid to a compressed gas, maintaining the gas pressure substantially equal to the liquid pressure, pressing the molten metal through a die by the compressed gas, and solidifying the metal in the die.

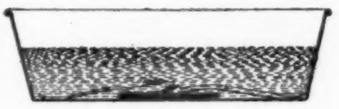
1,092,935. April 14, 1914. **Flux for Purifying Aluminum and Its Alloys.** Grenville Mellen, East Orange, N. J. Assignor of one-half to United Aluminum Ingot Company, New York.

This invention relates to means for purifying molten aluminum or its alloys from mechanically entrained impurities which result from frequent remelting of scrap metal, and from stirring the molten metal. The impurities are largely aluminum oxid, resulting from the superficial oxidation of the scrap, or from the oxidation of the metal when molten, said oxids being stirred in the mass of the metal and mechanically held therein, since oxid of aluminum has a higher specific gravity than the metal.

The inventor claims: A flux for purifying aluminum and its alloys, comprising sulphur in the proportion of 30 to 70 per cent., the remainder being a carrier less volatile than sulphur, either sodium chloride or sulphide may be employed.

1,092,985. April 14, 1914. **Appliance for Cleaning Tarnished Metals.** M. M. Tetters, Laporte, Ind.

The present invention relates to an appliance for cleaning tarnished metal articles. One of the objects of the present invention is to provide a battery element of novel or unique construction.

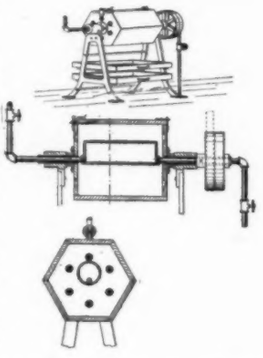


The improved appliance, as shown in cut, comprises two plates of suitable sheet metal, one being preferably fashioned from aluminum, and the other being preferably fashioned from zinc, whereby the aluminum and zinc plates will be electro-negative and electro-positive with respect to one another, although, jointly, the two plates will form an electro-positive or anode.

These plates may be of various contours and proportions, the same being illustrated as circular or in the form of disks.

1,093,078. April 14, 1914. **Machine for Drying and Polishing Articles of Jewelry.** H. B. Richardson, Attleboro, Mass.

The present invention relates to machines or apparatus for drying and polishing articles of jewelry, etc., and it consists in the construction and arrangements of parts, as shown in the cut.



The object of the invention is to produce mechanically actuated means for drying and polishing articles of jewelry in a more efficient, thorough and rapid manner and at a reduced cost, as compared with fixed sawdust-carrying tanks usually employed for drying jewelry.

The patent covers a machine of the general character described, comprising in combination a stationary frame or housing provided with a pair of longitudinally separated alining bearings, a vented polygonal-shaped hollow drum adapted to loosely contain a moisture-absorbent substance, as dry sawdust, said drum having a normally closed charging opening formed in its side wall, annular trunnions fixed to and extending outward from the ends of the drum mounted in said bearings, means for revolving the drum, a non-revoluble hollow member adapted to form a heater positioned within the drum.

1,095,078. April 28, 1914. **Process of Producing Copper Alloys.** Henry Bryda, Blackstone, Mass.

The present invention relates to a method of producing a copper alloy, which for certain purposes may be used as a substitute for gold.

The object of the invention is to provide a process whereby an inexpensive substitute for gold can be produced, which material will not change color or corrode or tarnish when exposed to ordinary atmospheric influence which will not rust, which retains brilliancy for a long period of time without frequently polishing, and which may be used for the production of jewelry or as a base metal for making table knives, forks, spoons and the like.

In carrying out his process the inventor preferably proceeds as follows: 16 ounces of copper are melted, and while molten a suitable quantity of tin or zinc, preferably about 1½ ounces, is added thereto, and the mixture agitated until the copper thoroughly alloys with the tin or zinc, after which 1½ ounces of quick lime are added and the material constantly agitated for 3 minutes or more, thereafter 1 ounce of "tartar of commerce" (crude potassium acid tartrate) is added and the mixture agitated for 2 minutes or more, after this 1 ounce of magnesia (magnesium oxid) is added, and the mixture again agitated for 3 or 4 minutes, after this ½ ounce of salammoniac (ammonium chlorid) is added, and the entire mixture is agitated steadily for one-half to three-quarters of an hour, more or less.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

ACCESSORIES OF THE AERON SYSTEM

By R. D. Waltz.

Their Relation to the Success of This Process of Finishing, as Brought Out in a Recent Interview.

"Mr. Customer, answering your question of, 'what portion of the success of the Aeron System is attributable to Aeron Accessories,' I will say, candidly, that the Aeron and its complete equipment are inseparable in the sense of service—one being as essential as the other if maximum results are to be obtained." So declared Mr. W. F. Gradolph, manager of sales of the Aeron System, for the DeVilbiss Manufacturing Co., of Toledo, Ohio, in a recent interview. He stated further: "As you know, there are certain correct principles which must of necessity be taken into consideration and adapted and embodied in the construction of anything mechanical if it is to be successful and beget success for those back of it.

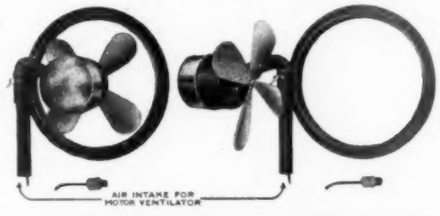
"The development of the proper and necessary accessories to the highest point of efficiency, and in turn the success of

THE AIR TRANSFORMER SET COMPLETE, AIR DUSTER AND AERON ASSEMBLED.

the Aeron System of applying lacquers, bronzes, in fact every kind of finishing material, is due to years of analytical and experimental work done along correct, scientific and mechanical lines. We have proved conclusively, separately and then as a whole the absolute necessity and correctness of principle of the accessories comprising the Aeron equipment.

"It might be interesting to you to know that scores of manufacturers, both metal and wood, now using the Aeron System have told us that they connot see how it would be possible for us to change our machine or equipment for the better, so successful have we been in directing our efforts in the right direction. Yet, let me say, that we maintain a large experimental department for the purpose of trying out and testing thoroughly every new and practicable idea, in a constant effort to increase the worth of the Aeron System to the finishing industry, as we believe this to be a service we owe to users and prospective users of the Aeron and to ourselves.

"Let me give you two illustrations of the productivity of



THE AERON AUTOCOOL ELECTRIC EXHAUST FAN.

our efforts in this regard. Only recently we made a change in our Air Transformer Set which placed it on a higher plane of usefulness and efficiency. With it all water, oil, grit, dust and foreign substance are absolutely removed from the air supply. It also permits of the regulating of the air to any pressure desired. This Transformer Set is a potent factor in the success of the Aeroning process and, as it stands today, there is a certain positiveness about it that could come only as a result of such work as I have outlined briefly.

"Another and perhaps a still greater improvement—our biggest recent achievement—is our Autocool Electric Exhaust Fan, which is indispensable as used in connection with the booth for the complete removal of all fumes and vapors arising from the work. The Autocool Electric Exhaust Fan comes as a result of years of experience and is an adaptation of the Ilg principle of fan motor cooling and ventilation. It is so constructed that the motor and fan blades can be swung inward at a 90 degree angle with the frame allowing for the easy cleaning of the blades.

"The motor is automatically cooled and fully protected because of this ventilating feature. Such a motor is at least a quarter more efficient than the ordinary enclosed motor. This cooling is accomplished by a current of air which is drawn through the hollow, supporting arm to the motor, and after passing around and through the moving parts of the motor this air is expelled with the exhaust. A ten-foot length of two-conductor cord with a socket plug attached, furnished with each fan, is also carried through this hollow arm and tube. The Autocool Fan can be furnished for any current and voltage." The developments of the accessories mentioned made such an impression of merit upon the writer that photographs of these particular accessories were secured and are here reproduced. There is no doubt in my mind that to apply finishing materials on metal or wood with air there is required something more than a receptacle for the material, a little air and a nozzle with which to guide and gauge the spray. One in buying an outfit of this kind should look well to the accessories to be included—surely they determine the degree of success of every such process.

METAL RIM RIDDLE

The E. J. Woodison Company, Detroit, Mich., have placed upon the market the metal rim foundry riddle which is shown in the cut. This riddle, as can be seen, has a metal rim and

THE WOODISON METAL RIM RIDDLE.

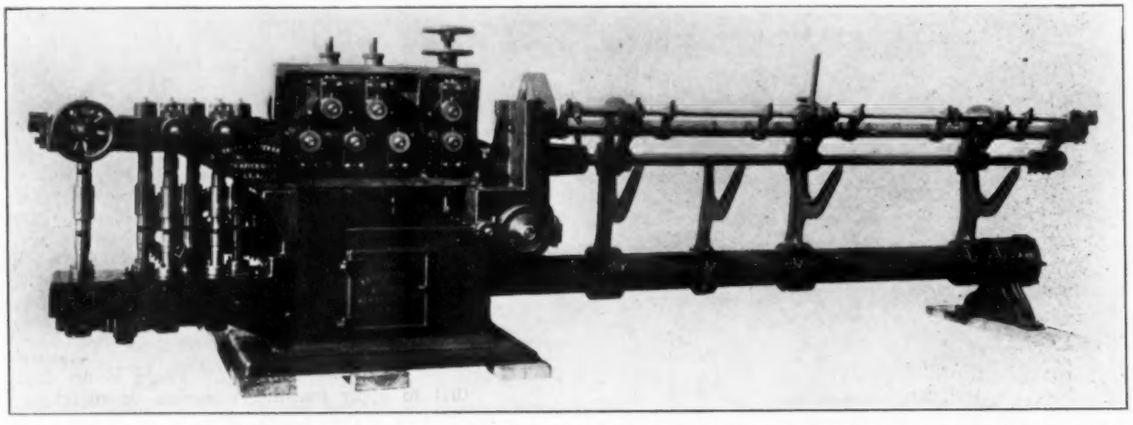
adjustable bottom which may be readily replaced. The rim, it is claimed by the manufacturer, will easily outwear a dozen wooden riddles and the refilling will cost considerably less than the wooden rim riddles can be had for. The Woodison

company are manufacturing these riddles in both 18 and 20 inch sizes and with both galvanized and brass bottoms or sieves.

This company has also just completed the installation of a buffing composition plant and they expect in the near future to manufacture all kinds of buffing compositions of the highest grade, including Woodison crystal finish for nickel on brass and iron, tripoli, crocus, emery cake, coloring compositions, etc.

GEARED ROLL STRAIGHTENER AND CUTTER

The machine illustrated is a recent development of The F. B. Shueter Company, of New Haven, Conn., and an addition to their line of straightening and cutting machinery for square and hexagon stocks. It is an improvement on the No. 6 machine described in this paper about a year ago, and its special feature is the independent adjustment of each of the vertical and horizontal straightening rolls. This has been accomplished by means of universal joints which connect all the straightening roll shafts and the roll gear shafts, giving a wide adjustment of the rolls without changing the meshing of the gears, and making it possible to handle the complete range of sizes within the capacity of the machine, of any one shape, with one set of rolls, saving the expense of extra rolls and the time consumed in taking off one set and putting on another.



GEARED ROLL STRAIGHTENER AND CUTTER, MANUFACTURED BY F. B. SHUSTER COMPANY, NEW HAVEN, CONN.

The rolls are grooved for the shape of material they are to handle, and the machine has a range of squares and hexagons ¾ to ⅜ inch or rounds of the same sizes. The machine consists of a substantial bed, on which is mounted a housing, containing five vertical and five horizontal straightening rolls, which are adjusted by means of the square head screws shown. There is a set of feed rolls at the rear and another at the front of the machine. A balance wheel, which connects with a train of gears operating all the rolls, drives the machine. The operation is as follows:

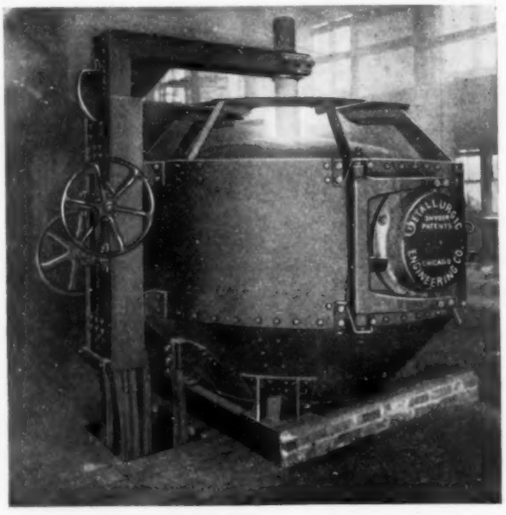
The coil of material is placed on a reel, at the rear of the machine, passes through guides arranged to receive it, into the back feed rolls, which grip it and carry it along through the horizontal or vertical straightening rolls, out into the front feed rolls, then through the stationary die, and into the covered guide bar until it strikes a gauge previously set for the desired length of cut. When it strikes the gauge it starts a clutch mechanism, which instantly stops the feeding of the stock, and at the same moment the cut-off is put in action and the cutter severs the piece, the cover of the guide bar is raised and the cut piece drops into the forked holders placed to receive it. The return of the cutter sets the feed rolls again in motion, and another piece is fed through, etc., until the coil is finished. The stopping of the feed rolls during the cutting off operation prevents any crowding of this heavy material against the cutters. This machine was arranged to cut lengths of 20 feet and shorter, but only a portion of the extension is shown, and it can be built to cut longer than this, as the maximum, if desired.

SNYDER ELECTRIC FURNACE

The Snyder system type of electric furnace is claimed to do the melting service that has been heretofore done in crucibles, side-blow converters and tilting oil furnaces. The electric melting of both ferrous and non-ferrous metals is said to be cheaper than crucible melting, as the cost of crucibles is entirely saved, and this amounts to more than the cost of the electric power rates.

Electric furnace melting of copper, brass and various metals and alloys by the Snyder system is claimed to be cheaper than with non-regenerative tilting types of oil furnaces, as the electricity costs less than the sum of the heavy metal loss and refractory items in the oil furnaces.

The actual cost of melting with electricity in these Snyder system types of furnaces depends upon the tonnage melted per day, the size of furnace used, the net cost of electricity under the actual conditions of use and the price of the melting stock available. The wear on the refractory lining of the furnace is exceedingly low on the Snyder system. The portions exposed to the most wear, such as the roof, are arranged to be rapidly and conveniently replaced. Owing to the tightly closed condition of the Snyder system electric furnace when in operation, the interior gases can be kept neutral and this causes a minimum loss of metal. In general the metal loss in the Snyder system electric furnace is said to be less than one-third that usual in fuel-heated furnaces.

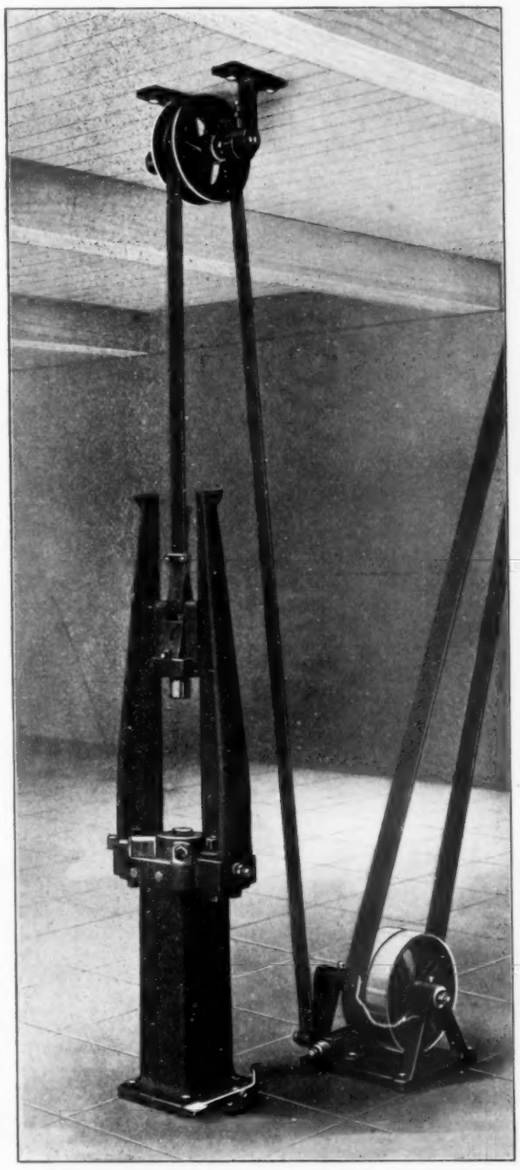


THE SNYDER ELECTRIC METAL MELTING FURNACE.

These furnaces are manufactured and sold by the Metallurgic Engineering Company, Chicago, Ill., and are described in bulletin No. 1026.

PECK PATENT DROP PRESS LIFTER

The illustration shows one of the methods of applying the Peck automatic drop lifter to a drop. The usual method of applying this lifter is to suspend it over the drop, attaching it directly to the ceiling (in case of small sizes) or by a frame work, yet there are times when it would be more convenient to place it on the floor behind the drop as shown in the cut. This is especially



THE PECK DROP PRESS LIFTER.

the case where there is not room above to give free action to the lifter. Where drops are being operated by hand or foot, by belt or rope over flanged pulley, it would be a simple matter to install the lifter by placing it in the position shown and passing lifting belt over the pulley, attach to the lifting crank. By the substitution of the Peck lifter for the hand or foot lifting device it is claimed more and better work can be turned out and with less fatigue to the operator. The lifter is readily attached and is operated by foot or hand treadle. It strikes one or more blows at the will of the operator, but is perfectly safe as the rebound of the hammer is surely caught and no false blow can be struck. The blow is always uniform and the height of the blow is readily adjusted. This insures uniformity in the pieces struck up, which uniformity is impossible with the hand lift. Moreover the output is greatly increased as both hands are free to handle the work. The Peck automatic drop lifter is made in 14 sizes, with capacities of working hammers from 15 to 5,000 pounds. They can be readily attached to board drop hammers by removing the friction rolls and connecting attachments.

Further information can be obtained relating to this novel device by corresponding with the Miner and Peck Manufacturing Company, New Haven, Conn.

MOTOR DRIVEN BALL-BEARING POLISHING LATHES

The accompanying illustration shows the new Gardner motor driven ball-bearing polishing lathe, manufactured by the Gardner Machine Company, Beloit, Wis. The notable features of this lathe are the motor, starter and spindle construction. The fully enclosed direct current motor is of the commutating pole type. It was shown in a recent test that the motor commutated 40 amperes at 220 volts without any

MOTOR DRIVEN BALL-BEARING POLISHING LATHE.

sign of sparking whatever. It has continuous rating of 4 horsepower and two-hour rating of 6 horsepower. The compound starter, with knife switch, is mounted within the base and made accessible by opening the hinged door at front. A speed variation of 2,000 r. p. m. to 3,000 r. p. m. may be obtained.

The extra heavy spindle is mounted in high grade ball bearings and in the No. 3 size is 49 inches in length. Its largest diameter is 2¼ inches; the diameter between flanges being 1¼ inches. The complete weight of the No. 3 is 850 pounds. This same type lathe is made in two smaller sizes, their No. 2 and No. 1. The former carries a spindle 42½ inches long, the diameter between flanges being 1 inch; the latter carries a spindle 32 inches long, the diameter between flanges being ¾ inch. While the above spindle lengths are standard and carried in stock, the manufacturers are in position to furnish special length spindles to meet special Casey way.

COPPER LEAD BEARING METALS

By Edward D. Gleason.*

A lead-copper alloy of fifty each is an ideal one for general machine bearings, on account of its unctuous nature and yielding properties, which is very essential to a good bearing. The high temperature required to melt this composition, viz.: between 1,200 and 1,500 degrees F., is sufficient proof of its adaptability to stand superheated steam. A set of bearings have been in use constantly 24 hours daily at a minimum speed of 1,000 r. p. m. for over one year (with an occasional stop sufficient to examine the bearing, which looked like planished copper, with no signs of wear) and showed a temperature 30 to 50 degrees lower than the high grade babbitt metal supplied by the turbine builders. Also, the oil in the bearing retainer which is in contact with the exhaust steam at 212 degrees F. was 180 degrees F., showing that there was no heat whatever generated in the bearings made of plastic copper (50 copper and 50 lead). Operating under the speed and conditions stated above, these bearings have stood up under a run which, if figured out, would show billions of revolutions and causing no trouble, such as the sudden melting of the lining as is occasionally the condition with babbitt metal under short runs. There is no anti-friction metal up to 90 per cent. tin that has the properties of a lead-copper alloy and which is at the same time lower in cost.

This metal can be handled in the shop as readily as anti-friction metals melting at lower temperatures. Shop conditions have something to do with this successful issue. The most serious objection being the "man" who does the pouring; if you can get him to follow directions and do a little thinking there will be no more trouble than pouring the ordinary bearing metals after the parts are lined up. The Neu-Metals & Process Company sells two grades of Plastic Copper bearing metal that is sold under an unconditional guarantee to outwear any bearing metal containing up to 90 parts tin. It is put up in small bars so it can be conveniently "cut up" for use. Copper and lead alloys are non-corrosive in hot liquors containing as much as 1 per cent. free hydrochloric acid, etc., at 100 degrees C. After calls had been made to know if we could produce such an alloy the conditions were met against high-price alloys, such as chrome-molyodenum with pure iron, etc. If any one is interested in practical tests of copper-lead mixtures as well as copper-lead-tin, they will find there are a great many more uses for this material than making it up into bearings and some of these I would be pleased to name on application.

*Neu-Metal & Process Company, 138 West avenue, Long Island City, N. Y.

Associations and Societies

REPORTS OF THE CURRENT PROCEEDINGS OF THE METAL INDUSTRY ORGANIZATIONS.

AMERICAN INSTITUTE OF METALS

President, G. H. Clamer, Philadelphia, Pa. Secretary and Treasurer, W. M. Corse. All correspondence should be addressed to the Secretary, W. M. Corse, 106 Morris avenue, Buffalo, N. Y. The objects of the Association are for the educational welfare of the metal industry. Annual convention with the American Foundrymen's Association in a succession of cities as invited. The next convention will be held in Chicago, Ill., September 7 to 12.

At a luncheon given early in April by the Chicago Foundrymen's Club, and at which the officers of the American Institute of Metals were guests, announcement was made of the election of the local committees in charge of the convention preparations. H. O. Lange, Ferguson & Lange Foundry Company, was elected president of the general committee; David Evans, Chicago Steel Foundry Company, secretary, and H. L. Hanson, Chicago Steel Foundry Company, assistant secretary.

The reception committee for the American Institute of Metals consists of the following: E. P. Welles, Charles H. Besly Company; I. M. Bregowsky, Crane Company; I. N. Perlstein, Great Western Smelting & Refining Company; Fred Moerl, Pullman Company; Charles McNellis, Imperial Brass Mfg. Company, and Harold Wolff, L. Wolff Manufacturing Company. Other local convention committees follow:

Entertainment Committee—A. G. McKinley, Griffin Wheel Company; S. T. Johnston, S. Obermayer Company; C. A. Hardy, Whiting Foundry Equipment Company; C. E. Hoyt, Foundry & Machine Exhibition Company, and Harry Pridmore, Henry E. Pridmore.

Banquet Committee—C. B. Carter, American Brake Shoe & Foundry Company; N. C. Peebles, Edgar Allen American Manganese Steel Company, and O. J. Abell, Iron Age.

Printing Committee—A. O. Sonne, Rogers, Brown & Company; Richmond Nicholas, Hickman, Williams & Company, and A. B. Hawes, Mathew Addy & Company.

AMERICAN ELECTRO-PLATERS' SOCIETY

(AN EDUCATIONAL SOCIETY.)

President, Geo. B. Hogaboom, New York; Secretary, F. C. Clement, 462 North 50th St., Philadelphia. Pa. All correspondence should be addressed to the Secretary. The objects of this society are to promote the dissemination of knowledge concerning the art of electro-deposition of metals in all its branches. The society meets in convention in the spring of each year, subject to the decision of the executive committee. The next convention will be held the first week in June, 1914, at Chicago, Ill. The branch associations hold monthly and semi-monthly meetings in their various cities.

The Newark branch held a very interesting meeting on Friday evening, May 1, and also had a good attendance, among the members were Abraham Van Winkle, of the Hanson and Van Winkle Company, pioneer manufacturer of platers' supplies; Edmond N. Todd, also connected with the above concern, and C. H. Proctor, founder of the society. The members of this branch voted for a club of members, as it is their intention to equip a laboratory which is to be centrally located for their personal use and so that Newark platers can visit the laboratory at any time and experiment with solutions, etc.

A committee was appointed to formulate plans and devise ways and means for carrying out the proposition.

The following officers were elected for the ensuing year:

President, Horace H. Smith; vice-president, J. E. Hartnett; secretary and treasurer, Charles A. Stiehle; recording secretary, Clarence O. Field; representatives to Supreme Society, Horace H. Smith, Samuel R. Taylor, Clarence O. Field.

THE GET-TOGETHER BANQUET OF THE BRIDGEPORT, CONN. ELECTRO-PLATERS

The Bridgeport branch of the American Electro-Platers' Society celebrated their admission into the society by giving a banquet and entertainment at the Fairfield Hotel on Saturday evening, April 25. Among the prominent men present were: C. H. Proctor, G. B. Hogaboom, W. A. Jones, T. B. Haddow and H. H. Smith. The speakers were introduced by C. H. Phillips, who acted as toastmaster. W. A. Jones, the first speaker of the evening, gave a very fine talk, and presented to the president, W. G. Stratton, the temporary charter. C. H. Proctor spoke on Connecticut as being the home of electro-platers and looked forward to the rapid advancement of the society in this state. G. B. Hogaboom, the speaker of the evening, gave an excellent talk, and wanted the members of the new branch to push forward with the idea of the betterment and enlargement of the whole society in mind. Dr. Stanley, of the Bridgeport High School, also spoke very interestingly on the subject. T. B. Haddow, of the New York branch, then spoke along the lines of advancement. H. H. Smith, of the Newark branch, gave a short talk, and H. De Joannis also addressed the platers. Among those present were the officers of the society: W. G. Stratton, president; B. F. Kusterer, vice-president; N. A. Barnard, secretary and treasurer; J. M. Dunn, librarian; T. F. Slattery, H. De Joannis and C. H. Poland, of the board of managers;

Electro-plating is one of the most fascinating of all occupations, as there are new things constantly developing which commands more than passing attention and the mysterious influence the effect of the electric current has upon a plating solution is more than interesting—it fascinates.

The plater is a peculiar being. He is wrapped up in his theories, thinking and talking of little but his occupation; his solutions act upon his nature as the atmosphere does upon a barometer and woe be to the one who crosses him when the indications are cloudy, a storm is certain to immediately follow. In his room he is a Monte Cristo—"monarch of all he surveys, whose right there is no one who 'dares' to dispute."

The old style plater did not specialize enough and therefore was not very successful. Solutions should be studied one at a time, until thoroughly mastered. The same amount of energy that is expended in worrying over a solution that has gone wrong, if applied to finding out and becoming thoroughly familiar with that one solution, would more than repay. Do not scatter your energy. The American Electro-Platers' Society should have laboratories at every branch so that practical demonstrations could be made. While meeting together and discussions are good, a greater benefit could be had by actually seeing accomplished what is being explained.

BRIDGEPORT, CONN., BRANCH OF AMERICAN ELECTRO-PLATERS' ASSOCIATION.

Chas. Phillips, 117 Union avenue; Thomas Brosman, Fred W. Joseph, P. A. Willett, Chas. Bennett, T. F. O'Brien, W. J. Thompson, F. C. Stanley, Ph. D., Geo. W. Baldwin, C. E. Chambers, W. McGovern, Stephen Masek, Andrew Tucker, James McCaffery, L. T. Warren, David Flemming, John O'Neil, C. P. Hodissey, W. F. Clark, Christian Wyrtzen, Fred A. Barrow, Wm. Kusterer, Geo. E. Hopkins, W. G. Loeffler, C. Tesko, all of Bridgeport; Thos. B. Haddow, New York; W. A. Jones, C. D. Ditmar, J. H. Stitt, New York; C. H. Proctor, Arlington, N. J.; E. L. Proctor, Arlington, N. J.; J. A. Garde, John J. Siebert, Chas. C. Ney, Harry Roberts, Wm. Gray, Wm. McKeon, Geo. P. Roberts, Waterbury, Conn.; A. N. Theriault, South Norwalk, Conn.; C. Frey, F. H. Piske, Charles Piske, Horace H. Smith, Samuel R. Taylor, Newark, N. J.; T. A. Trumbour, THE METAL INDUSTRY, New York; R. E. Massicotte, North Bergen, N. J.; A. P. Gilligan, E. M. Stephenson, Hartford, Conn.; D. C. Daggett, W. S. Ayer, A. E. West, New Haven, Conn.; Newell F. Wightman, South Meriden; Geo. B. Hogaboom, New Britain, Conn.; E. S. Cameron, New York; Albert Pott, Bridgeport; A. J. MacDermot, Wyandotte, Mich.; John Pistey, Bridgeport.

The following speech was made by George B. Hogaboom, the subject of which was "The Plater":

The Philadelphia branch held its regular monthly meeting at the Harrison Laboratory Building, University of Pennsylvania, on Friday evening, May 1. The subject of etching on nickel plated steel without spoiling the surrounding nickel deposit was discussed. All future meetings of this branch will be held at the University.

THE ANNUAL CONVENTION

The second annual convention of the American Electro Platers' Society will be held on June 4, 5 and 6, at the Fort Dearborn Hotel, Chicago, Ill. The meeting will be an open one, to which all foremen platers are invited and members are requested to attend and take part in all discussions. Everyone directly interested in electro-plating will be welcome. There will be no formal exhibition, but members and visiting platers are requested to bring and informally exhibit some of their handiwork. During the convention papers will be read and discussed and a luncheon and smoker will end the convention on the evening of the 6th. The committee of arrangements are: S. E. Huenerfauth, E. Lamoureaux, H. E. Willmore, O. E. Servis, J. P. Manz, J. F. Carr and F. J.

Liscomb. O. E. Servis, 3020 George street, Chicago, Ill., is secretary of the committee.

The committee has prepared the following provisional programme.

THURSDAY, JUNE 4.

10 a. m.—Assembly and reception of delegates, Fort Dearborn Hotel.
10:15 a. m.—Address of welcome by First Vice-President Joseph H. Hansjosten.
10:30 a. m.—Response by Supreme President George B. Hogaboom.
10:45 a. m.—Session of Supreme Board on Credentials, etc.
11:30 a. m.—Adjournment.
1:30 p. m.—Convention session.
5:30 p. m.—Adjournment.
8 p. m.—Papers.

FRIDAY, JUNE 5.

9:30 a. m.—Convention session.
11:30 a. m.—Adjournment.
12:30 p. m.—Assembly of delegates.
12:45 p. m.—Start on tour of plating plants.
8 p. m.—Papers.

SATURDAY, JUNE 6.

9 a. m.—Convention session.
11:30 a. m.—Adjournment.
1:30 p. m.—Convention session.
2:30 p. m.—Installation of new officers.
3:30 p. m.—Final adjournment.
7 p. m.—Smoker and luncheon Chicago branch, Fort Dearborn Hotel; papers, impromptu.

This program is not intended to be iron-clad, and can be deviated from to suit the convenience of the convention details.

It has been decided that all sessions of the convention will be open, and anyone interested in the promotion and advancement of the art and science of the electro-deposition of metals are invited to be present, whether or not they are members of the society.

It is suggested that this would be a very good opportunity for members of the eastern branches to stop off at Rochester, Buffalo and Detroit and meet members of the branches in the above cities, and it would also be a good time for these branches to arrange for open meetings.

The members from New York, Newark, and Connecticut branches en route for Chicago could, no doubt, arrange the following schedule:

Leave New York Monday morning, June 1, stop off at Rochester and attend meeting there on Monday night. Leave Rochester Tuesday morning, arrive at Niagara Falls three hours later, see the Falls, etc., returning to Buffalo and attending meeting of Buffalo branch on Tuesday evening. Leave Buffalo on twelve o'clock train arriving at Detroit nine o'clock Wednesday morning, attend meeting of Detroit branch on Wednesday evening. Then go from Detroit direct to Chicago. As there would doubtless be at least twenty-five members en route, including attendance from Rochester, Buffalo, Toronto and Detroit, a private car could be secured and the platers would have an opportunity of relating their plating experiences while on the way from Detroit to Chicago.

NATIONAL ASSOCIATION OF BRASS MANUFACTURERS

Invitations for the next meeting were extended by San Francisco, Toledo and New Orleans, but after careful consideration the meeting concluded to hold its mid-summer meeting in Detroit, Mich., in June, just preceding the joint meetings that will be held in that city by the Eastern, New England and Central Supply Associations.

AMERICAN ELECTRO CHEMICAL SOCIETY

President, F. A. Lidbury, Niagara Falls, N. Y.; Treasurer, Pedro G. Salom; Secretary, Jos. W. Richards, Lehigh University, South Bethlehem, Pa., to whom all correspondence should be addressed. The object of the society is the advancement of electrochemistry. Meets twice a year. The XXVI General Meeting will be held in Niagara Falls, N. Y., in October, 1914.

On Friday, April 17, there was an all-day excursion by steamboat around New York harbor and Staten Island, combined with visits to the plants of the American Smelting and Refining Company, the United Lead Company, and the Waclark Wire Company. The arrangements for the meeting were in the hands of the New York Section of the American Electrochemical Society, and the smoker on Thursday and the steamer party on Friday were complimentary affairs tendered by the New York Section.

ITEMS OF INTEREST TO THE INDIVIDUAL.

J. B. Mendenhall, formerly with the National Lead Company, is now Southern representative for the Great Western Smelting & Refining Company, St. Louis, Mo.

Hugh McPhee, who is a well-known brass foundry superintendent and foreman, has become foreman of the brass foundry of Pratt & Cady, Inc., Hartford, Conn. The firm is noted for its large and varied castings and makes valves, giving Mr. McPhee an opportunity to exercise his knowledge of the brass foundry business.

Dr. Richard Moldenke, accompanied by Mrs. Moldenke, returned home May 5 from a short visit to Turin, Italy. Dr. Moldenke went abroad to attend a council meeting of the International Society for Testing Materials, at which standard specifications were discussed. The doctor will render a report at the meeting of the American Society for Testing Materials at Atlantic City, June 30-July 4, 1914.

R. F. Pearson, who has been connected with the metal department of Bruce & Cook, 190 Water street, New York, has resigned his position with that firm to become manager of the recently established pig tin department of the North American Copper Company, 164 Front street, New York. The latter company is the sole American agent for the United States and Canada of Richard & Freiwald, London.

Mr. Newton E. Dabolt has accepted a position with the sales department of the Celluloid Zapon Company, New York. Mr. Dabolt is a graduate of Syracuse University and for the past five years has been in the laboratory and production departments of the General Electric Company at the Pittsfield (Mass.) plant. He should prove a valuable man to the Celluoid Zapon Company, who are following their usual policy of using on their sales force men who are trained in chemistry and electroplating.

C. G. Backus, formerly with the Backus & Leeser Company, manufacturers of electro platers' supplies, has started in business for himself at 410 West 13th street, New York. Mr. Backus has been identified in the electro plating supply business for the past 17 years. For a long time he was superintendent of the former Zucker, Levett & Loeb Company. Mr. Backus is an expert on installing plants and has written a number of articles on this subject for THE METAL INDUSTRY. At his new address he will carry in stock everything required to equip plating and polishing plants.

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS AND TRADE ITEMS OF INTEREST FROM THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

WATERBURY, CONN.

MAY 4, 1914.

Business is impoving somewhat in local factories of the brass and copper industries, but it is still more or less hesitant, and seems likely to continue that way for some time. There is evidence of readjustment to new conditions and new competition, and this, with the conditions of the market as they are, has prevented the aggressive speed in local industries that charges the atmosphere with the odor of good times. There is nothing weak in conditions, and yet there are still many unemployed and short time persons all through this section, though in the brass and copper business perhaps there are fewer than in most of the other industries of Connecticut.

There have been some meetings recently of manufacturers interested in improving the water facilities of the Naugatuck river, and it is not unlikely that there will be another big dam added to the series of old and new structures of that character, which are more or less attractive parts of Naugatuck valley scenery, within a few months. Officers of the American Brass Company, the Platt Brothers Company, the Seymour Manufacturing Company of Seymour, and other concerns in Waterbury and Naugatuck, are interested in the project. The location is said to be between Naugatuck and Derby.

Water and sewage are somewhat in the limelight hereabouts now, owing to the beginning of a new suit for $50,000 damages, brought by the Platt Brothers Company against the city of Waterbury for failure, on the city's part, to keep sewage out of the Naugatuck river, which washed the company's property. Once before this company sued the city of Waterbury in a similar case, and the city has been in contempt of court ever since because it has not been able to find a means of disposing of its sewage without violating the court's order. The city has spent thousands on a sewage disposal plan, but until it gets some more thousands the job cannot be completed.

Connecticut has many such problems, and as soon as Middletown and Hartford begin to expand industrially along their river banks there will doubtless be more suits against cities and towns, unless, in the interim, the state takes up the whole problem, and finds a way of regulating sewage disposal that will be efficient and economical, neither depriving industries of the use of as much water as they get now, nor forcing them to endure unsanitary conditions such as exist at times.

It is true that the large volume of water below Waterbury in the Naugatuck river is due to the large volume of waste that flows through Waterbury's sewers into the river. This is not Naugatuck river water, and any sewage disposal plan that would turn it out of the Naugatuck would seriously reduce the flow of the river, and make some of the dams south of this city appear ridiculously out of proportion in most seasons of the year. Waterbury's water consumption is between 7,000,000,000 and 10,000,000,000 gallons of water daily, and probably no less than sixty per cent. of that flows into the Naugatuck river, keeping it from running dry from four to six months of the year.

It is of interest to the manufacturer, then, as well as the city and the town, to have the sewage disposal question settled in such a manner that the value of water rights may not be impaired, particularly in these days of hydro-electric power development. F. B. F.

BRIDGEPORT, CONN.

MAY 4, 1914.

Metal conditions in this city continue in about the same plane as heretofore and none of the large concerns report any violent changes pro or con. The general opinion, however, seems to be that business is improving, whether on account of the final arrival of spring and its consequent increase in all lines or whether on account of an actual increase in demand, it is hard to say. Most all of the leading manufacturers wish that business was better, but are doing their best under the circumstances. It was hoped that things would brace up when the country started the trouble with Mexico, people pointing out that after the Spanish war began there was a boom for four years, but now that war does not seem so imminent, the looked-for improvement has not arrived. There is a large increase in the idle car report but this is accounted for by the falling off of coal shipments. Signs are favorable that the freight rate decision will be announced soon and this, it is expected, if favorable, will do a lot to improve conditions. The copper market has held its own and for futures appears stronger while aluminum is about the same.

The Union Metallic Cartridge Company continues to run full blast and is increasing its forces, not on account of the Mexican situation, but on account of the usual spring rush. It is pointed out by the officials of the company that their orders are all placed by the New York office so that they never know here for whom the ammunition is intended.

Manufacturers of motor boat engines and parts are very busy and consider their orders about the same as last year while the plant constructing submarines for the government is working overtime. The sale of vacuum cleaners continues excellent, bringing increased orders to the aluminum foundries and electrical concerns. The silverware firms are still finding things dull and the graphaphone concerns are no busier than last month. One of the large builders of boring machines reports an order from a western automobile plant, to be delivered by July first.

The automobile manufacturers and dealers are doing a very good business, rather better than some other lines. The bicycle supply manufacturers continue to enjoy a very good trade and, of course, the arrival of spring with its increased sales has been the dominant factor. One concern reports orders for 30,000 headlights for motorcycles and cars. These are of drawn brass and, of course, it will mean increased business for the brass goods factories. The brass rolling mills and makers of brass tubing, etc., report business as very fair, continuing the impetus which they received a couple of months ago.

The aluminum foundries find orders increasing, especially on small work, and are quite hopeful of the outlook for the summer. Brass foundries are running about the same as in the past few months. A manufacturer of brass plumbers goods and supplies was not at all optimistic about present conditions or future business and another large plant making brass and bronze pipe fittings is running only five days a week with chances of cutting down more yet.

The annual meeting and banquet of the Manufacturers' Association was held on April 21 and addressed by H. W. Forster, chief engineer of the Independence Inspection Bureau, on "Safety Devices for the Prevention of Accidents." The association has issued its thirteenth annual report describing the work done during the past year. Considerable time and investigation was given to the Workmen's Compensation Act and the members kept advised of the progress of the act. Other laws passed at the last session of the state legislature were the 55-hour law, prohibiting the employment of any minors under sixteen years of age or any woman, more than 55 hours in one week; the polishing and buffing law, empowering the state factory inspector to order the installation of devices for the removal of excessive dust from these rooms where the dust is detrimental to the health of the employees.—F. H. C.

NEW BRITAIN, CONN.

MAY 4, 1914.

Regarding the manufacturing conditions in New Britain it may be said with safety, as indeed most of the manufacturers themselves are wont to express their views, that the past month has been one of moderate activity and, while those at the head

of the large concerns here feel that they should be doing more business than they are at the present time, nevertheless they are not alarmed, as they were not anticipating any great rush. At the American Hardware Corporation there is no doubt but that the output is greatly below that of a year ago this time, but that can be explained in many ways, one of which is that in most cases the orders are for the foremen in the factory to fill, no stock orders, but to simply care for the immediate orders on hand. While there is no reason for alarm at the Stanley Rule & Level Company, the fact remains that business is not brisk as it usually is during the spring of the year. Because of this a few of the office employees have been laid off until such times as there is more clerical work necessitated by larger orders.

"Still expanding" is the slogan of the G. E. Prentice Manufacturing Company, which was described in last month's METAL INDUSTRY as one of the rapidly growing plants of this locality. Since the last edition of this paper the firm has purchased a two-story brick building, which they occupy at present. The officers state that they feel, in order to meet all their orders, it will be necessary to provide room for four times the number of men now employed. Buckles are made by this concern. In the buckle line business seems good, also at the North and Judd Manufacturing Company and also at the Traut and Hine Manufacturing Company. The Union Manufacturing Company is not behind either, and has just completed the addition to its factory, and the Skinner Chuck Company is just starting a large addition to their concern.

New Britain's latest metal manufacturing concern is the International Buckle Company, which has just filed a certificate of incorporation with the Secretary of State. The capital stock will amount to $50,000, divided into 2,000 shares at $25 per. The company will begin operations with $1,000 paid in. The incorporators are: Frederick M. Holmes, Herbert A. Johnson and Fred J. Ward, of this city, and George C. Clark, of Terryville.

An echo to the changes in the office at the Russell and Erwin division of the American Hardware Corporation chronicled in the April issue of THE METAL INDUSTRY, is now heard in the promotion of Russell Gold, a former employee of the contract department, to the position of assistant superintendent left vacant by the resignation of Henry H. Voight, the patent king.

It is stated in financial circles that Charles M. Jarvis, former president of the American Hardware Corporation, is the active manager of the White Adding Machine Company, of New Haven, Conn. He and Ex-Governor Rollin S. Woodruff, together with Max Adler, a wealthy New Havener, have been interested in this concern for some time, and the company has recently changed its capitalization from $1,000,000 common stock to $300,000 preferred and $700,000 common.—H. R. J.

PROVIDENCE, R. I.

MAY 4, 1914.

The metal trades manufacturers in this city and vicinity are finding some business, but not so much as a month ago and far behind that of the similar period a year ago. During the past month there has been a general curtailment among the factories and foundries of this city and Pawtucket, one plant cutting down production about one-quarter. About the only branch of the metal trades that can be said to be showing any activity are those connected with automobile accessories, and these are fairly busy.

The reports from the manufacturing jewelers indicate the worst conditions experienced since 1893, with nothing in sight to indicate any improvement for months to come. Not only has there been no orders received, but it is with increasing difficulty that collections are made on goods sold a number of months ago. During the first three months of this year the total liabilities of jobbing houses of the United States and Canada that have failed was $645,805 as against $446,757 in 1913; $472,606 in 1912 and $470,927 in 1911.

At a recent meeting of the directors of the Gorham Manufacturing Company, held at the company's office in this city, Barton P. Jenks, president of the William B. Durgin Company, of Concern, N. H., was elected a vice-president of the Gorham Company, and O. V. Kean, of Toronto, was appointed superintendent of the company's plant at Elmwood.

The election of Mr. Jenks is an addition to the number of vice-presidents that the company has had for several years. The appointment of Mr. Kean is to fill the vacancy caused by the resignation of Fred C. Lawton, who had been superintendent of the plant for about twenty years previous to some five months ago. Mr. Kean is at present superintendent and general manager of the Canadian Rogers Company at Toronto, and has been in that position for some years.

The Standard Machinery Company has practically completed the work of dismantling its old plant at Beverly street, this city, and removing to its new plant at Auburn and settling down to the regular routine. The new plant is at present being operated on practically the full force from the old plant, but the company expects in a short time to increase its force and to begin operations to the full capacity of its largely increased facilities. The Hope Foundry has ceased operations at Warren, and on April 20 work was started for the first time at the company's new plant at Auburn, near the plant of the Standard Machinery Company. It is expected that before the middle of this month all the property of the concern will be removed to the new location, set up and everything in running order.—W. H. M.

BALTIMORE, MD.

MAY 4, 1914.

The Baltimore Tube Company has made large improvements and have put in a new brass foundry and are manufacturing some special products which are being placed on the market.

The International Machine and Stamping Company have moved its plant from 101 N. Frederick street.

The Florence Silver Plate Company, of 108 West Lombard street, making hollow ware, are going into the manufacture of silver specialties of brittania, plated, and also to do considerable plating work.

W. E. Wilson, vice-president and general manager of Brooks Solder and Metal Works, reports that they are putting up a new building 75 x 100 feet to be used in connection with smelting drosses and also as an office. This company makes tinner's bar, plumber's wiping solder, babbitt metals, type metals, zinc, etc., and their total capacity for metal is 50,000 pounds per day.—H. S.

LOUISVILLE, KY.

MAY 4, 1914.

Louisville metal workers report that business is only fair, and the outlook at present is not very encouraging for any big developments for some time to come. The prohibition wave which has struck Kentucky and Illinois has scared the distillers to a point where they are very uncertain regarding future or present improvements. Plants which are generally run down are operating in makeshift way rather than go to any expense in re-adjusting. The prospects, however, are that by next fall confidence will be re-established, and repairs which should have been made last fall will be attended to.

Secretary C. J. Thoben, of the Vendome Copper and Brass Works, reports that business is very good with his concern at present, but all of the work is at a distance from Louisville, which makes it a little harder to handle. A new plant is under course of construction at Algiers, La., which is said to be the largest Bourbon plant south of Kentucky. The plant will have a capacity of 1,000 bushels a day.

Matt Corcoran, Jr., of Matt Corcoran & Company, reports that the company's shop is barely busy, and most of the work now being done is on castings for various purposes. No large jobs are booked, and things are hanging fire as far as distillery work is concerned. He reports that the distillers with whom he generally does business are in an attitude of watchful waiting, and he does not expect business to pick up much until late in the fall.

W. P. Davis, who supplies the Louisville trade with copper, brass, and other metals, has been on a trip to Mobile and New Orleans. His office reports that business is slightly better than it has been for the past sixty days.

George F. Ahlers, of Ahlers & Gregoire, said that his main business at present is doing copper work for the canneries, and he is booking a goodly amount of work in Arkansas, Kentucky and the Central States.

Rindt Brothers, formerly the Art Brass and Plating Works, have installed natural gas under the boiler in their plant. Gas was brought into Louisville from West Virginia recently by the Louisville Gas and Electric Company, and several concerns are testing it out. Falls & Withers, coppersmiths of Louisville, have installed gas under the furnaces which they use for melting metals, and it is said to be working very satisfactorily. Bud Withers, the junior partner in the concern, at one time had a lot of experience in melting metals with crude petroleum and compressed air at the old Howe Manufacturing Company's plant, of which he was foreman, and should as a consequence have very little trouble with gas. The gas rate is thirty-five cents a thousand cubic feet, which makes it a very cheap fuel. Since the gas company quit making artificial gas coke has been very hard to obtain locally.

Manager J. W. Rademaker, of the Independent Brass Foundry, is getting a good deal of Government work for the Quartermaster's Station at Pensacola, Fla. He has just completed a number of large brass packing rings, which are for use in steam chests of Government battleships. He has had quite a demand this spring for propellor wheels of "silver bronze" from local motorboat enthusiasts. Silver bronze wheels do not corrode like those made of other materials. Forty new molding flasks have been received from the Oscar Barnett Company, Newark, N. J.

Tom Hines, of Hines & Ritchey, stated that distillery work, as far as his concern is finding it at present, is so quiet as to be nearly dead, and deserves to have crepe hung on it. He has done some fairly good jobs of late for some of the big milk concerns, who use tinned coils filled with brine to attain low temperatures in pasteurizing. He is also doing a good deal of work for canning factories at present. A large amount of the work is for canneries which make catsup. Especial care has to be maintained in catsup cookers which use steam coils in cooking tomatoes. The coils have to be tinned on the outside thoroughly, and placed so that no pockets will catch tomatoes which would ferment and spoil a big run of stuff.

The Continental Brass & Foundry Company, St. Louis, Mo., has been incorporated for $2,500. The incorporators are Ferd Messmer and Lewis F. Ostrander, of St. Louis, G. D. Klemme, of Belleville, Ill., and Joseph Messmer, of Kirkwood, Mo. —G. D. C., Jr.

BUFFALO, N. Y.

MAY 4, 1914.

There is little speculation on the part of founders in this locality as to the future condition of business. Most foundries are working under 50 per cent. capacity ever since the first of the year, with a very slight increase during the past month. The foundry men are only buying such supplies as are absolutely necessary, as conditions do not appear to have a very optimistic future. The foundry and rolling mill men attribute this dull period to little activity in the building lines, labor conditions and the action of the Administration toward business. As a result buyers are holding off and not projecting any of their operations.

The electroplating and finished metal producing trade, strange to say, find trade conditions good, and have been all year. The trade, generally, has not been rushed, but there has been a constant flow of business with some prospects of it picking up in the future. Zero Valve and Brass Manufacturing Company have been having an exceptionally good year. Working their forces overtime, sometimes as late as ten and eleven o'clock at night in order to fill their orders.

The Buffalo Copper and Brass Rolling Mill have been running at 50 per cent. capacity since the first of the year, as orders have been only coming in with fits and starts. With the H. R. DeMilt Company, as their representatives in New York City, they are expecting great results from this connection. A new comer, the National Bronze Foundry, has been meeting with a fair degree of success, especially during the last month. They do all kinds of jobbing work in brass, bronze, and aluminum castings, etc.

The American Bronze Company has just moved into its new $20,000 foundry, which is a steel, brick structure of 60 x 160 feet. Three-fourths of the building is one story while the remainder is two stories. The building is well lighted and equipped with modern improvements. Due to a big strike in one of its mines, the Buffalo Copper Smelting Works have not been working as it might.

Buffalo opened its new Technical High School April 21, 1914, which is one of the best equipped schools of its kind in the country. This school will prove itself of great value to the local metal industry.

A certificate of incorporation was filed in the Erie County Clerk's office recently by the Philip Christmann & Sons Company, capitalized at $20,000, to carry on a metal work business.—G. W. G.

TORONTO, ONT.

MAY 4, 1914.

Fred Demers has bought out the Madigan Plating Company and changed the name to Demees Plating Company, 109½ Adelaide street, West. He thinks of manufacturing some lines of goods.

The Benedict-Proctor Company, of Syracuse, N. Y., who came here a year ago and established a plant at 33 Church street, which has been dismantled of late owing to their buying up the plant of De Fries and Woodman at Alliston, Ont. This plant is a big one and has been remodeled and enlarged. They will make jewelry boxes and clock cases of cast metal, soda water fountain supplies of brittania ware, rolled plate and sterling silver jewelry, plated hollow ware and may make tin spoons. The solid gold line will be discontinued, and a popular-priced line will be turned out instead. The former plant in Church street will be used for showrooms.

The Domestic Novelty Manufacturing Company, of 352 Adelaide street, West, are making metal novelties and do plating on a small scale.

G. T. Pepall, of M. and L. Samuel Benjamin Company, reports that they are doing a large metal business in tin, zinc, aluminum, copper and antimony.—H. S.

CINCINNATI, O.

MAY 4, 1914.

The business depression which has prevailed in all branches of trade, including the metal industry very generally, is still much in evidence in Cincinnati, where machinery manufacturing is one of the largest industries, both in the number and variety of plants and in the value of the products turned out. Most of these concerns report that they are running on slow time, waiting for the long-expected brace-up to materialize, and in spite of having comparatively little to do, are very optimistic, pointing to the fact that there is nothing essentially wrong with business, and no reason why things should not be active. The coppersmiths specializing in distillery supplies and equipment are finding little call for their work, as the manufacturing season for the distillers is not yet over, and with the increasing agitation in favor of prohibition there seems to be strong ground for believing that they will not spend any more money than they have to on new work and betterments.

The Metal Specialty Company, a well-known Cincinnati concern, is one of the numerous manufacturers and others who have made arrangements for space in the Manufacturers' Permanent Exhibit Building which is to be constructed during the current summer on a piece of ground immediately behind the Union Central building, in which the quarters of the Cincinnati Chamber of Commerce are located. The Sanitary Manufacturing Company, turning out plumbing equipment, the Cookson Steam Specialty Company, and numerous brewers and distillers are also among those who will have space in the building.—K. C. C.

COLUMBUS, OHIO

MAY 4, 1914.

The metal market in Columbus and all parts of central Ohio has been quiet to the extreme. Prices have slumped to a certain extent and the volume of business is decreasing. The cause of this condition is the bad business conditions that prevail in many lines of manufacturing which is reflected upon the metal market. The prospects for the future are not as bright as might be wished, but they are growing better.

Practically all metals are selling at lower levels than prevailed a month ago. This is true of brass, copper and aluminum.

Copper in crucible shape is quoted at $14.25 to the trade, while red scrap brass is quoted at $11.75. Yellow scrap brass is quoted at $8.50. Aluminum is also lower and is quoted as follows: New clippings, 12½ cents and old scraps 10 cents. Babbitt metal is one of the strongest points in the market. Other metals are unchanged from the previous month.

Edgar E. Richardson, aged 55, a well-known tinner of Columbus, died recently at his late home, 133½ East Main street, from paralysis. He leaves a large family. The Monarch Metal Company, of Canton, Ohio, has started the erection of a new factory building adjacent to the Pennsylvania railroad tracks. The name of the DeForest Electric Welding Company, of Cleveland, Ohio, has been changed to the Lake Erie Electric Welding Company.

The Globe Pattern Company, of Cleveland, has been incorporated with a capital of $5,000, to make and sell metal patterns, by Daniel Cameron, Peter H. Grossman, Martin Thomas Ruddy, Ralph Moffatt, and Mathias J. Walther.

At Massillon, Ohio, the Massillon Aluminum Company has awarded a contract to the John Meinhart Company for the erection of a new building. It will be of brick, 230 feet long and two stories high. The construction will be fireproof. Papers have been filed with the Secretary of State increasing the authorized capital of the John W. Brown Manufacturing Company, of Columbus, makers of automobile lamps. The concern recently moved into a new plant on Marion road. A large contract for supplying the Ford company with lamps has been signed.—J. W. L.

DETROIT, MICH.

MAY 4, 1914.

Outside the automobile business, only one branch of the brass and aluminum industry has shown much improvement during the last several weeks. Manufacturers of plumbers' supplies are reporting a decided revival in business, demands coming from outside the city, as well as in. Detroit is undergoing a great building boom at present; no less than six new skyscrapers are going up, and all these are using Detroit-made plumbing supplies. This demand, together with that coming from outside the city, is causing a considerable boom in this line of brass goods.

Few people have any idea of the amount of lead consumed in this city. It comes in the shape of pigs from Missouri and other producing states, great quantities being manufactured into lead pipe, sash weights, frames and stained glass windows, solders, babbits and various other compounds. Every joint in a cast iron pipe for water pressure or waste has to be made tight with lead, which is melted and calked in. Large quantities of this material are shipped from here to all parts of the country. The demand for this material at the present time is reported good, much better than in the last month or so.

The manufacture of brass and electrical supplies shows a fair condition at the present time, but not what it might be. So long as building conditions remain good, this demand will remain normal, is the belief of manufacturers who have recently discussed this branch of the metal industry. The automobile industry at the present time is in full swing, and the usual amount of brass and aluminum is being used by these plants, but a let-up is anticipated later in the year when the orders placed during the early spring have been filled. However, conditions in this line may prove a surprise, and the industry continue good until late in next fall.

The headquarters of the Aluminum Castings Company, which have been located in Cleveland, are to be moved to this city. It is understood the transfer will be made within the next week or so.—F. J. H.

B. W. Collins, factory supervisor of the Lozier factory, says the output of four cylinder cars has been pushed upward to twenty cars per day and they are unable to keep step with the demand. Orders are still coming faster than cars are produced. The maximum factory capacity is rapidly being attained, but it is doubtful even with night shifts if they can catch up by midsummer.

The Acklin Stamping Company, of Toledo, have recently opened a Detroit office at 920 Ford Building. They are large manufacturers of metal stampings for automobile parts and, as the volume of business they are doing for the Detroit automobile manufacturers is constantly increasing, their Detroit office is a natural result. The office will be in charge of W. C. Acklin, secretary of the company.

The manufacturers of steam and plumbing brass goods report a fair demand for their products and collections above the average.

The Standard Brass Works, located at 97-106 Wight street, manufacturers of a general line of brass goods, are running to their normal amount of business for this month and trade is seasonably good on the whole.

The copper mines in Michigan are now settled down and there are now in the neighborhood of 15,000 men working in the mines of the Michigan copper district, or, roughly, 1,000 more than when the strike began eight months ago. These forces will probably be increased another 2,000 men during the next two months, for all the copper mining companies are making arrangements to take on larger crews. Many men are being added to the pay rolls daily and the mines are daily increasing their production. The production right now is about 60,000 tons of rock per day.—P. W. B.

NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

The Eynons-Evans Manufacturing Company, Philadelphia, Pa., is making additions to its foundry at an estimated cost of $4,000.

Receiver Bell, of the Stamford German Silver Company, Stamford, Conn., reports that a reorganization plan is now under way and may soon be carried to completion.

The item in the April issue of THE METAL INDUSTRY gave the address of the West Bend Aluminum Company as West Bend, Ind., when it should have been West Bend, Wisconsin.

The Franklin Brass Foundry, Young street and Starr avenue, Long Island City, N. Y., will build a one-story brick foundry 100 by 100 feet. This company operates a brass foundry and finishing shop.

The published report that the Standard Sanitary Manufacturing Company, Preble street, Pittsburgh, Pa., will build a foundry and machine shop to cost $12,900 is said to be, by the company, unfounded.

The Hawley Down Draft Furnace Company, of Easton, Pa., has recently sold a number of Hawley-Schwartz furnaces to manufacturers of aluminum goods. The Hawley-Schwartz furnace is said to have been used successfully for this purpose for several years.

The McFarland Foundry and Machine Company, Trenton, N. J., manufacturers of castings and special machinery, will build a one-story addition to their machine shop, which will enable them to install a few large tools to increase the output of their general jobbing work.

The Crane Company, Chicago, Ill., manufacturers of pipe fittings and brass goods, are building a new plant at 39th street and Kedzie avenue, and in which will be consolidated all of their different departments, which are at present scattered about Chicago in four or five separate locations.

The Balbach Smelting & Refining Company, Newark, N. J., announce that they are engaged in erecting a lead desilvering plant of 4,000 tons monthly capacity and in this connection are building a smelting plant for ores and lead residues and a parting plant for gold, silver and platinum.

The Buffalo Foundry and Machine Company, of Buffalo, N. Y., announces that they have terminated the arrangement whereby H. E. Jacoby has been representing them in New York City and vicinity. They are now handling direct all

inquiries covering vacuum apparatus, castings, patterns and machine work.

The Jackson Metal Products Company, Jackson, Mich., recently organized, has acquired the plant formerly occupied by the State Foundry Company. The greater part of the necessary equipment has been purchased, but some new machinery will be added. The new company will manufacture radiators and sheet metal stampings.

The Aluminum Goods Manufacturing Company, manufacturers of aluminum cooking utensils, Newark, N. J., report that in a few weeks they will start work on a four-story 260 x 60 feet reinforced concrete building and also a one-story building 150 x 50 feet for foundry purposes. Both buildings will be modern in all respects.

The Osborn Manufacturing Company, 5401 Hamilton avenue, Cleveland, Ohio, manufacturers of brushes and foundry supplies, will build a new three-story factory. This addition to their plant will be largely confined to their molding machine and wire wheel brush department and which expansion was due to the excellent sale of these lines of goods during the past year.

The Battle Creek Sand Sifter Company, Battle Creek, Michigan, announce that they have sold a number of their belt-driven and hand power sifters to platers for use in separating saw-dust from the metal parts after drying out. They state that their machines are particularly adapted to this work and that the method is quick, effective and inexpensive.

The American Bronze Company, Berwyn, Pa., manufacturers of "Non-Gran" bearing bronzes, will build an addition to its plant which will increase the capacity of the foundry 40 per cent. and of the finishing department 75 per cent. The company has also just erected and equipped a testing and experimental laboratory where daily tests of its products and research work will be made.

Manning, Maxwell & Moore, New York, railway and machinists' tools and supplies, report that their plans in reference to the Putnam Machine Company, Fitchburg, Mass., the ownership of which they took over some time ago, are rather indefinite and do not wish to give out any further particulars at this time. Rumor has it that the erection of a large machine shop and foundry is to be begun within sixty days.

The New Era Lustre Company, 92 William street, New York, announce that since moving from New Haven to their new and up-to-date factory at Passaic, N. J., and under the methods adopted by F. S. Cobb, president and general manager, they are forging ahead of all of the company's previous records. They state that there is a good demand for their lacquers at the present time in spite of the general business depression.

The Pacific Ornamental Iron Works, Inc., 1942-1946 South Main street, Los Angeles, Cal., intends to build a completely new shop which will have approximately 45,000 square feet of floor space. The factory is to be modern in every respect and the company desires to hear from manufacturers of machinery and appliances that can be used to advantage in the production of ornamental iron, brass and bronze work. The company operates a brass foundry metal working shop and plating room.

The Diehl Manufacturing Company, Elizabeth, N. J., manufacturers of electrical apparatus, have installed a plating plant at their works, Waverly, N. J. The outfit consists of the plating room containing 3½ K. W., 5-volt motor generator set, four large tanks, together with the necessary washing apparatus and incidentals necessary to electro-plating. In connection with the plating plant they have a large japanning room where japan or enamel finishes are placed upon their various apparatus as specified.

The engineering department of the Warner Brothers Company, Bridgeport, Conn., has brought out the Warner silent tilting tumbling barrel, No. 2, designed for the grinding and polishing of small stampings, forgings and castings. The barrels are polygonal in form and of cast iron, brass or wood, and are adjustable for running at the desired angle. The drive is by worm and gear, running in oil, from a single pulley equipped with an internal expanding friction clutch, operated from the same side of the machine as the tilting crank. The driving mechanism is inclosed to minimize the risk of accident.

Walter L. Loeb has resigned his connection with the Munning-Loeb Company, having on March 1 sold out his entire interests to Cleveland E. Watrous, who for the past nine years has been manager of the New York office of the Cutler Hammer Manufacturing Company. Mr. Watrous will make his headquarters at the company's factory at Matawan, N. J. The Munning-Loeb Company will celebrate the completion of their third year of operation on May 20. In this issue of THE METAL INDUSTRY they make an announcement, thanking their customers who have been instrumental in helping to build up their business on a sound basis to large proportions and assuring all of even better service in the future than in the past. The company manufactures and handles everything required for the operation of plating, polishing and buffing plants.

ANNUAL MEETING

At the annual meeting of the stockholders of the Joseph Dixon Crucible Company, held at the company's main office in Jersey City, N. J., on Monday, April 20, 1914, the retiring board of directors, consisting of Geo. T. Smith, William Murray, George E. Long, Edward L. Young, William G. Bumsted, J. H. Schermerhorn and Harry Dailey, were unanimously re-elected. The officers of the company, consisting of Geo. T. Smith, president; George E. Long, vice-president; J. H. Schermerhorn, treasurer; Harry Dailey, secretary, and Albert Norris, assistant treasurer and assistant secretary, were also re-elected.

DISSOLUTION

On April 24 the Backus & Lesser Company, manufacturers of electro plating materials, 410 West 13th street, New York, issued an announcement that the stockholders of the company had decided to give up the business and in order that the creditors would be protected to the best advantage they called a meeting for April 27. On that date a sale took place of the machinery and supplies owned by the company, which equipment was bought by a broker for another party. The company announced that by this sale and their other assets they expected to pay in full all creditors and a committee was appointed to co-operate with the company and see that the creditors' interests were protected. The committee consists of Robert Thompson, representing the Charles S. Platt Company; William Crane Andrews, representing the Spencer & Turner Company, and B. P. Finanan, lawyer. Mr. Robert Thompson, of the committee, reports that the outlook is good for the final payment of 100 cents on the dollar.

FIRES

The plant of E. F. Lake, consulting metallurgist and special correspondent, Detroit, Mich., was burnt out recently. Mr. Lake is now located at 412 Pennsylvania avenue, Detroit, Mich.

The plant of the Canadian Wolverine Brass Company, manufacturers of high grade plumbing specialties, Chatham, Ont., Canada, was partially destroyed by fire to the extent of $30,000 but which was mostly confined to the manufacturing department which will not be in operation for the next thirty days. The company had a good supply of material on hand at the time of the fire and they are also getting new goods from their Grand Rapids (Mich.) factory.

CHANGE OF FIRM NAME

The firm name of Kann & Wysor, analytical chemists and metallurgists, has been changed to Robert Kann, and the business will be continued at 124 Front street, New York, with increased facilities for analyzing metals, iron and steel and waste products. The additional equipment will include all the latest appliances for rapid and accurate work.

INCREASE IN CAPITAL STOCK

The stockholders of the Murphy-Potter Company, Detroit, Mich., at the annual meeting acted favorably on a motion to change the name of the company to the Brass and Aluminum Foundry and Machine Company. Coincident with the new name of the old company came an announcement that William E. Carpenter, for the last three years sales manager of the company, has been promoted to the general managership. The new name indicates the scope of the products of the company. It is widely known in the trade for its bronze shell babbitt-lined bearings, geared circulating pumps for oil and water, carbureters, brass and aluminum castings and general contracting work in brass and aluminum.

The Buffalo Copper and Brass Rolling Mill, Buffalo, N. Y., manufacturers of copper sheets and rods, copper anodes, brass sheets, rods and wire, etc., have increased their capital stock from $500,000 to $1,000,000.

The Plymouth Foundry and Machine Company, Plymouth, Wis., recently increased its capital stock from $30,000 to $65,000. Plans have just been completed for the erection of a two-story brick warehouse, 60 x 136 feet.

The Bunting Brass and Bronze Company, manufacturers of brass, bronze and aluminum castings, Toledo, Ohio, has increased its capital stock from $50,000 to $100,000, which increase was made to provide an outlet for accumulated surplus.

The Waynesboro Metal & Foundry Company, Waynesboro, Pa., manufacturers of brass and bronze castings, etc., has increased its capital to $50,000. They report that they are building a foundry 60 x 130 feet, to take care of increased business.

REMOVALS

The American Metal Company, Ltd., announce the removal of their offices to 61 Broadway, New York City.

Wightman and Richards, counsellers and consulting engineers in technical advertising, have moved their offices from 29 Broadway to 50 Union Square, New York City.

The office of the American branch of Beer, Sondheimer & Company, dealers in metals, has been moved from 42 Broadway, to the Adams Express Building, 61 Broadway, New York City.

The American Buff & Wheel Company, manufacturers of buffs, wheels, polishing compounds, etc., have moved their office and plant from Twenty-seventh street, New York City, to 58 First street, Hoboken, N. J.

The Eagle Smelting & Refining Works, B. Lissberger & Company, proprietors, manufacturers, smelters and dealers of metals, have moved their offices from 734 East Fourteenth street, to the Woolworth Building, 233 Broadway, New York City.

The New York office of the Mumford Molding Machine Company was closed April 1, and E. H. Mumford, vice-president and general manager, has moved his office to the factory, 2059 Elston avenue, Chicago, Ill., in order that he may be in close touch with the business.

The S. A. Day Manufacturing Company, Buffalo, N. Y., has moved its office and factory to 23-25 Demond Place, Buffalo, N. Y., where it will occupy all of a three-story building. This firm manufactures Crescent white finish, buffs of all kinds, polishing compounds, etc., and carries a full line of platers' and polishers' supplies.

The H. S. Wyckoff Company, 60 Arlington street, Newark, N. J., has moved its plant to 269-275 Broome street, Newark, N. J., where it will have larger facilities for taking care of increased business. They are installing more up-to-date machinery and expect to use considerable more labor. This company manufactures the well known "Wycko brand" of tripoli, rouge, crocus, emery paste, etc.

The E. Reed Burns Metal Polishing and Supply Company, who have been located at 162 North Desplaines street, Chicago, Ill., have found it necessary owing to their increasing business to move to larger quarters at 412-414 North Morgan street, Chicago. In the new location they are in a modern building and with improved facilities are able to take care of orders more promptly and in a better manner than heretofore. The manager, Frank E. Terrio, will be glad to have any of the company's old friends call at their office, especially those who may be attending the convention of the American Electro Platers' Society at Chicago in June.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Correspondence" columns.

To manufacture brass and other metal beds.—The Canadian Mesereau Company, Ltd., Toronto, Ont., Canada. Capital, $25,000. Incorporators: F. L. Groff, John Abel and Charles Bolte.

To manufacture brass, bronze and aluminum castings and machine screw products.—The Atlas Brass Foundry Company, Columbus, Ohio. Capital, $65,000. Incorporator, John Wittman.

To install scientific methods and systems of handling scrap materials.—William Jacobus, scrap metallurgist and salvage expert. Capital, $5,000. Incorporators: W. Jacobus, M. J. Levine, and E. C. Ecker.

To manufacture metal specialties.—Metal Specialty Company, Kansas City, Mo. Capital, $30,000. Incorporators: B. P. McKinley, president; J. F. Kendig, vice-president, and A. J. Davies, secretary and treasurer.

To manufacture expanded metals.—Charles H. Scammell Company, Trenton, N. J. Capital, $100,000. Incorporators: Charles H. Scammell, of New York City; Scott Scammell and John R. Scammell, of Trenton, N. J.

To manufacture brass stampings.—Cataract Brass Stamping Company, Buffalo, N. Y. Capital, $50,000. Incorporators: F. E. Wattles, president; W. A. Morgan, vice-president and treasurer, and F. G. Davis, secretary. The company has acquired the plant of the Grimm Manufacturing Company.

To manufacture brass and aluminum castings—The Northwest Aluminum and Brass Foundry, Rochester, N. Y. Capital, $10,000. Incorporators: John R. Laysen, George A. Hetzler and Charles E. Tupper, all of Rochester. The company has completed the erection of a foundry building 50 x 100 feet for the manufacture of aluminum, brass and bronze castings.

To manufacture aluminum cooking utensils.—The Massillon Aluminum Company, of Massillon, Ohio, has been incorporated with a capital of $200,000. The company has purchased the plant of the Reed Glass Company, which will be remodeled and machinery will be installed. A modern brick plant will be erected in the near future. The incorporators are Frank H. Snyder, J. V. Miller, I. M. Taggart, Charles F. Snyder and Robert R. Hess.

GOVERNMENT WANTS

Proposals will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until 10 o'clock a. m., May 26, and publicly opened immediately thereafter to furnish at the Navy Yard, Brooklyn, N. Y., a quantity of naval supplies as follows: Sch. 6738, 1 inch hexagon naval brass bar, spring and soft brass sheet, 12 feet lengths of round and flat copper bars; Sch. 6739, 12 feet lengths of seamless

drawn brass pipe. At the Navy Yard, Boston, Mass., Sch. 6738, round rolled naval brass, soft and hard brass sheet, copper sheets and strips, not tinned; Sch. 6739, brass pipe, 16 feet lengths of seamless drawn copper pipe; Sch. 6744, 16 and 18 feet lengths of ¼ inch brass pipe. Also to furnish at the Navy Yard, Washington, D. C., Sch. 6736, six rolled aluminum plates, commercial lengths of naval bronze rod, and at the Navy Yard, Annapolis, Md., Sch. 6734, brass pipe.

Applications for proposals should designate the schedules desired by number. Blank proposals will be furnished upon application to the navy pay office nearest each yard, or to the bureau. T. J. Cowie, Paymaster-General, U. S. N.

FOREIGN TRADE OPPORTUNITIES

[In applying for addresses at Bureau of Foreign and Domestic Commerce, Washington, D. C., refer to file number.]

No. 12,926. Hardware of all kinds.—An American consular officer in the Far East reports that a firm of general merchants in his district desires the names of American manufacturers of building hardware, such as hinges of all sizes, locks, bolts, etc., suitable for doors and for windows; also shelf hardware, such as files, rasps, screw drivers, chisels, handsaws of all varieties, etc.

No. 12,951. Bronze sheets.—An American consular officer in Germany reports that a manufacturer of writing materials in his district desires to receive offers, with samples, from American manufacturers of thin bronze sheets in strips, hammer hardened, but which may easily be bent. Prices should be stated f. o. b. Hamburg, and samples should be inclosed in all cases. Correspondence may be in German or English.

PRINTED MATTER

Crucibles.—Frederic B. Stevens, manufacturer of foundry supplies, polishers' and platers' supplies, Detroit, Mich., has recently issued a handy little booklet on "The Care of Crucibles." A copy will be sent free upon request to interested parties.

Polishing and Burnishing Machines.—A compact little folder has been issued by H. J. Astle & Company, Providence, R. I., giving illustrations and descriptions of the line of Boland polishing and burnishing machines which they manufacture.

Crucibles.—The Bay State Crucible Company, Taunton, Mass., have issued a folder giving the sizes and capacity of the expensive line of crucibles which they manufacture for use in rolling mills and tilting furnaces. This company also manufactures other special articles for foundry use made from graphite.

Graphite Products.—The Ross-Tacony Crucible Company, Tacony, Philadelphia, Pa., have issued a handsome little catalog giving a complete description of the line of graphite products manufactured by them. These include crucibles for all purposes, both regular and special, retorts, stirrers, skimmers, stoppers, nozzles and sleeves.

Ventilation.—The Cleveland Blow Pipe and Manufacturing Company, Cleveland, Ohio, are distributing a small folder telling of the strong points of their vacuum ventilator which is used for plating and annealing rooms and foundries and also dust collecting systems for polishing, buffing and emery wheel. The folder also contains the sizes and price list.

Foundry Equipment.—The Northern Engineering Works, Detroit, Mich., have issued a new crane catalog No. 26, which describes and illustrates electric and hand power cranes, electric and pneumatic hoists and also overhead track systems. While this catalog is somewhat condensed, it contains references to small bulletins which more fully explain the numerous designs.

Crude Oil.—"Burning Crude Oil" is the title of a handbook issued for architects and heating engineers by the American Heat and Power Company, Oakland, Cal. The book is full of data relating to the use of fuel oil and also contains a number of letters from consumers who testify to the excellent results obtained by the use of this fuel, under the American company's system. Copies of the handbook will be furnished upon request.

Ventilators.—The Cleveland Blow Pipe and Manufacturing Company, Cleveland, Ohio, have issued a small folder giving full description of their vacuum ventilator, for which they claim a number of advantages, the principal of which is that it ventilates and actually changes the air in a room. This ventilator can be used with great effect in the ventilation of foundries, and especially in plating rooms and where vaporizing machines may be in use.

Monel Metal.—A very interesting treatise on Monel metal has been issued by the Bayonne Casting Company, Bayonne, N. J. The book contains a complete description of the many and varied uses for which Monel metal is adapted and also gives some valuable instructions as to how the metal should be handled, particularly in reference to its machining. Specifications as adopted by the United State Government for Monel metal are also included in the subject matter.

"Yale" Locks.—The Yale & Towne Manufacturing Company, Stamford, Conn., manufacturers of builders' hardware, have issued a very interesting work on the history of the Trade-Mark "Yale." The book contains 75 pages and gives a full account of the origin of the well-known trade-mark "Yale" of this company, and also contains a report of the decisions and decrees in court cases caused by attempts of other manufacturers to imitate the Yale & Towne Manufacturing Company's goods and trade-marks.

Valves and other specialties are described in a new catalog and price list No. 5, just issued by the A. W. Cadman Manufacturing Company, Pittsburgh, Pa. The catalog, which contains twenty pages, is fully illustrated and contains descriptions of the various styles of Cadman valves, including bronze, acid metal and semi-steel. The Cadman indestructible gage cock is also described, together with information relating to Cadman's aluminum Babbitt metal, of which there are three grades—Acorn, Homestead and O. K.

Pyrometers.—A very handsome catalog No. 9 has been issued by the Brown Instrument Company, Philadelphia, Pa., containing complete descriptions of what is claimed to be the most complete line of indicating and pyrometer instruments in the world. The catalog, which is very expensively gotten up, gives complete descriptions, together with prices of these instruments. Also arguments are put forth as to why Brown pyrometers should be used and the reader is shown where and how they are used. Copies will be sent upon request.

Anti-Friction Metal.—A new departure in a descriptive hanger has been issued by A. Allan & Son, of New York, manufacturers of Allan metal. This hanger is a fine example of the printers' art in a reproduction of a blue print. Detailed suggestions are given showing the internal parts of a rail mill roughing engine piston. Full instructions are given on the blue print under the heading of "How Pistons Are Constructed for Allan Metal," and this matter being printed in readable size of clear-face type makes the hanger most valuable for use in an engineer's office. It seems to us that a copy of this blue print should be in the office of every engineer, and also in the engine room of every plant.

INQUIRIES AND OPPORTUNITIES

Under our directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. pages.

CATALOG EXHIBIT

An exhibition of every kind of catalog may be seen at The Metal Industry office, 99 John street, New York. The Metal Industry is prepared to do all of the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

METAL MARKET REVIEW

NEW YORK, May 11, 1914.

COPPER.

There was not much doing in copper until about the last half of April. The break in the London market, when the Mexican muddle became acute, unsettled buyers here. At the same time producers could not hold the fancy prices they had been getting and the market broke from 14⅝ to 14¼ cents and some sales were made by outsiders at as low as 14 cents for Electrolytic. When President Wilson and Secretary Bryan decided that war with Mexico was not really war London speculative prices advanced and buyers here came into the market. Some good buying was done by home consumers and Europe was an active purchaser. On the strength of this buying and the better feeling abroad producer pushed the price up to 14⅜ cents and that is the producers' price today. The market is not overly strong and there are several sellers today at ⅛-cent per pound below the pegged price of the leading producers. Some producers say they have sold more copper during the first four months of this year than they did during the same period in 1913. General deliveries to consumers do not exactly bear out this statement but probably some of the other producers sold so much less.

Business conditions this year are very much worse than last year and the copper market could not possibly have stood the dullness had it not been for the enormous exports. We have exported so far this year 151,943 tons against 127,520 tons for the same period last year.

The European stocks show a slight increase for the month of April, but taking them for the four months we find stocks today of 30,000 tons against 44,000 tons a year ago.

Seeing that we have passed through four of the worst months for business that some merchants have ever known the steadiness of the copper market has been remarkable and with any kind of a fair business reaction the prices of today may look very cheap.

Lake is obtainable today at around 14½ cents, Electrolytic at about 14¼—producers ask 14⅜—and casting brands at close to 14 cents.

TIN.

It seems the London bears have been playing against some German bulls and the London crowd have had the best of it. The price of tin today is around 34 cents against 45 cents a year ago. The visible supply of tin April 30 was 15,447 tons against 12,000 tons a year ago. Consumption here is pretty good, tin plate mills are busy and deliveries of tin are likely to be comparatively heavy. It is just a question whether tin at today's price is not very, very cheap. It looks good at 34 cents. We will know more about it perhaps later.

LEAD.

The lead trust put up the price of lead $2.00 a ton—they do not have to give any reason for their action—the Mexican disturbance was probably the excuse. The price today is 3.90 New York, and about 3.80 in East St. Louis.

SPELTER.

The price of spelter did not hold in face of the general trade dullness and spelter sold as low as 5 cents New York, at the close the market is a little steadier and the price of carloads is 5.10 New York and 4.90 at East St. Louis.

ALUMINUM.

Market is easier again and prices are about ¼-cent per pound lower. Ingots in ton lots are obtainable today at around 17⅞ cents per pound and smaller lots a shade higher.

ANTIMONY.

Cookson's is about the same as last month, 7¼ cents, with Hallett's a shade easier at 6⅞, with Hungarian grade at around 6 cents.

SILVER.

The silver market has been affected with the Mexican troubles and prices are somewhat higher. New York is at 59¼ cents and London 27-3/16d.

PLATINUM.

Prices show hardly any change. Ordinary refined is quoted at $43 to $44, with 10 per cent. hard at $46 to $47 and 20 per cent. hard at $49 to $50 per ounce.

QUICKSILVER.

The trust price for wholesale lots is $38 per flask with jobbing lots at $39 to $40.

SHEET METALS.

There has been no change in the price of sheet copper or copper wire—sheet is quoted at 19¾ cents base and wire at 15½ cents base. High sheet brass unchanged at 14¼ wholesale.

OLD METALS.

The market for old metals has been very quiet, consumers seem to get along without buying anything and prices are inclined to be easier.—J. J. A.

APRIL MOVEMENTS IN METALS

	Highest.	Lowest.	Average.
COPPER.			
Lake	15.00	14.50	14.75
Electrolytic	14.65	14.00	14.40
Casting	14.35	14.00	14.20
TIN	38.00	34.40	36.10
LEAD	3.90	3.80	3.85
SPELTER	5.30	5.00	5.25
ANTIMONY (Hallett's)	7.00	6.95	7.00
SILVER	59¼	58⅛	58.51

WATERBURY AVERAGE

The average price of Lake Copper per pound as determined monthly at Waterbury, Conn.

1912—Average for year, 16.70. 1913—Average for year, 15.83. 1914—January, 14.75; February, 15.125; March, 15.00; April, 14.85.

COPPER PRODUCTION

(Issued by the Copper Producers' Association.)

Combined reports of March and April, 1914.

		Pounds.
Stocks of marketable copper of all kinds on hand at all points in the United States, April 1, 1914....		64,609,319
Production of marketable copper in the United States from all domestic and foreign sources during March and April, 1914.....		297,152,513
	Pounds.	
March	145,651,982	
April	151,500,531	
		361,761,832
Deliveries:		
For domestic consumption.....	133,279,982	
For export	171,907,382	
	Pounds.	
March	159,414,515	
April	145,772,849	
		305,187,364
Stocks of marketable copper of all kinds on hand at all points in the United States May 1, 1914....		70,337,001
Stocks decreased during the month of March.....		13,762,533
Stocks increased during the month of April.....		5,727,682

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the Report alone is $10. Sample copies furnished for the asking. We can furnish daily telegraphic reports of metal prices. Address THE METAL INDUSTRY, 99 John street, New York.

Metal Prices, May 11, 1914

METAL PRICES.

	Price per lb. Cents.
Copper—Pig and Ingot and Old Copper. Duty Free. Manufactured 5 per centum.	
Lake, carload lots, nominal	14.50
Electrolytic, carload lots	14.35
Castings, carload lots	14.00
Tin—Duty Free.	
Straits of Malacca, carload lots	34.00
Lead—Duty Pig, Bars and Old, 25%; pipe and sheets, 20%. Pig lead, carload lots	3.90
Spelter—Duty 15%. Sheets, 15%.	
Western, carload lots	5.10
Aluminum—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½c. per lb.	
Small lots, f. o. b. factory	23.00
100 lb. lots, f. o. b. factory	21.00
Ton lots, f. o. b. factory	18.00
Antimony—Duty free.	
Cookson's cask lots, nominal	7.25
Hallett's cask lots	6.85
Hungarian grade	6.00
Nickel—Duty Ingot, 10%. Sheet, strip and wire 20% ad. valorem.	
Shot, Plaquettes, Ingots. Blocks according to quantity	.38 to .43
Electrolytic—3 cents per pound extra.	
Manganese Metal—Duty 10%	.75
Magnesium Metal.—Duty 25% ad valorem (100 lb. lots)	1.50
Bismuth—Duty free	2.00
Cadmium—Duty free	.95
Chromium Metal—Duty free	.98
Quicksilver—Duty 10%	.53
	Price per oz.
Gold—Duty free	$20.67
Platinum—Duty free	43.50
Silver—Government assay bars—Duty free	.58¾

INGOT METALS.

	Price per lb. Cents.
Silicon Copper, 10% according to quantity	27 to 32
Silicon Copper, 20% " "	34 to 36
Silicon Copper, 30% guaranteed " "	36 to 38
Phosphor Copper, guaranteed 15% "	25 to 28
Phosphor Copper, guaranteed 10% "	22½ to 26½
Manganese Copper, 25% " "	25 to 29
Phosphor Tin, guaranteed 5%. " "	59 to 61
Phosphor Tin, no guarantee. " "	38 to 40
Brass Ingot, Yellow " "	10½ to 10⅝
Brass Ingot, Red " "	12 to 14
Bronze Ingot " "	13⅛ to 13½
Manganese Bronze Ingots " "	18 to 19½
Phosphor Bronze " "	18 to 20
Casting Aluminum Alloys " "	16 to 18
Phosphorus—Duty free. According to quantity	30 to 35

OLD METALS.

Dealers' Buying Prices. Cents per lb.		Dealers' Selling Prices. Cents per lb.
12.50 to 12.75	Heavy Cut Copper	13.75 to 14.00
12.25 to 12.50	Copper Wire	13.25 to 13.50
11.00 to 11.25	Light Copper	12.25 to 12.50
10.75 to 11.00	Heavy Mach. Comp	12.00 to 12.25
7.50 to 7.75	Heavy Brass	9.00 to 9.25
6.25 to 6.50	Light Brass	7.50 to 7.75
7.50 to 7.75	No. 1 Yellow Brass Turnings	8.50 to 8.75
9.50 to 10.00	No. 1 Comp. Turnings	10.75 to 11.25
3.35 to ——	Heavy Lead	—— to 3.65
3.75 to ——	Zinc Scrap	4.15 to 4.25
5.50 to 6.50	Scrap Aluminum Turnings	7.00 to 8.00
11.50 to 12.00	Scrap Aluminum, cast, alloyed	13.00 to 14.00
13.00 to 14.00	Scrap Aluminum, sheet (new)	14.00 to 15.00
23.00 to 24.00	No. 1 Pewter	25.00 to 26.00
20.00 to 23.00	Old Nickel	20.00 to 23.00

PRICES OF SHEET COPPER.

BASE PRICE, 19¾ Cents per Lb. Net.

Width.	LENGTH.	64 oz. and over.	32 oz. to 64 oz.	24 oz. up to 32 oz.	16 oz. up to 24 oz.	12 oz.	14 oz.	18 oz.	13 oz.	11 oz.
		Extras in Cents per Pound for Sizes and Weights Other than Base.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	½	1	1½	2	2½
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	½	1	2	3	4½
	Longer than 96 inches. Not longer than 120 inches.	"	"	½	1	2	3	5	7	
	Longer than 120 ins.	"	"	1	1½					
Wider than 30 ins. but not wider than 36 inches.	Not longer than 72 inches.	"	"	Base	Base	1	2	3	4	6
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	2	4	6	8
	Longer than 96 inches. Not longer than 120 inches.	"	"	1	2	3	4			
	Longer than 120 inches.	"	1	2	3					
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	"	Base	1	2	3	4	6	8	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	4	5	7	9	
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	6	9			
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	5	7	9	11	
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	7	10			
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Longer than 120 inches.	3	5	9						
Wider than 108 ins., but not wider than 120 ins.	Not longer than 120 inches.	4	6							

The longest dimension in any sheet shall be considered at its length.

CIRCLES, 8 IN. DIAMETER AND LARGER, SEGMENTS AND PATTERN SHEETS, advance per pound over prices of Sheet Copper required to cut them from ..... 3c.

CIRCLES LESS THAN 8 IN. DIAMETER, advance per pound over prices of Sheet Copper required to cut them from ..... 5c.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot and heavier, advance per pound over foregoing prices ..... 1c.

COLD OR HARD ROLLED COPPER, lighter than 14 oz. per square foot, advance per pound over foregoing prices ..... 2c.

COLD ROLLED ANNEALED COPPER, the same price as Cold Rolled Copper.

ALL POLISHED COPPER, 20 in. wide and under, advance per square foot over the price of Cold Rolled Copper ..... 1c.

ALL POLISHED COPPER, over 20 in. wide, advance per square foot over the price of Cold Rolled Copper ..... 2c.

For Polishing both sides, double the above price.

The Polishing extra for Circles and Segments to be charged on the full size of the sheet from which they are cut.

COLD ROLLER COPPER, prepared suitable for polishing, same prices and extras as Polished Copper.

ALL PLANISHED COPPER, advance per square foot over the prices for Polished Copper ..... 1c.

ZINC— Duty, sheet, 15%.

	Cents per lb.
Carload lots, standard sizes and gauges, at mill	7.00 basis, less 8%
Casks, jobbers' prices	7⅞c.
Open casks, jobbers' prices	8¼c.

Metal Prices, May 11, 1914

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect March 16, 1914, and until further notice.

To customers who buy over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.14¼	$0.16	$0.17⅝
Wire	.14	.16	.17⅝
Rod	.14	.16¾	.18⅜
Brazed tubing	.18¾	—	.22⅛
Open seam tubing	.18¾	—	.22⅛
Angles and channels, plain	.18¾	—	.22⅛

50% discount from all extras as shown in Brass Manufacturers' Price List.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass	½c.	per lb. net advance
" —Best spring, drawing and spinning brass	1½c.	" " " "
Wire —Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

To customers who buy 5,000 lbs. or less per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.15½	$0.17¼	$0.18⅝
Wire	.15¼	.17¼	.18⅝
Rod	.15¼	.18	.19⅝
Brazed tubing	.20	—	.23⅝
Open seam tubing	.20	—	.23⅝
Angles and channels, plain	.20	—	.23⅝

Net extra as shown in Brass Manufacturers' Price List.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass	½c.	per lb. net advance
" —Best spring, drawing and spinning brass	1½c.	" " " "
Wire —Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

BARE COPPER WIRE—CARLOAD LOTS.

15½c. per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	20½c. per lb. base
100 lbs. to 300 lbs. in one order	21c. " " "
Less than 100 lbs. in one order	22½c. " " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ O. D. Nos. 4 to 13 Stubs' Gauge, 16c. per lb.
Seamless Copper Tubing, 19½c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron pipe sizes with price per pound.

⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
24	23	18	17	16	16	16	16	16	16	16	17	18	20	22	23

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1⅛ inch	22	24
1¼ inch	25	27
1½ inch	32	35
1¾ inch	45	48
2 inch	56	69

Discount 55%.

PRICE FOR TOBIN BRONZE AND MUNTZ METAL.

Tobin Bronze Red	18c.	net base
Muntz or Yellow Metal Sheathing (14" x 48")	15c.	" "
" " " Rectangular sheets other than Sheathing	17½c.	" "
" " " Rod	15c.	" "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bar in the rough, 23⅞c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Sheet Block Tin—18" wide or less. No. 26 B. & S. Gauge or thicker. 100 lbs. or more 5c. over Pig Tin. 50 to 100 lbs. 6c. over, 25 to 50 lbs. 8c. over, less than 25 lbs. 10c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more 4c. over Pig Tin. 50 to 100 lbs. 5c. over, 25 to 50 lbs. 7c. over, less 25 lbs. 9c. over.

Above prices f. o. b. mill.

Prices on wider or thinner metal on request.

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

Gauge.	Width. Inches.	1 ton.	500 lbs.	50 lbs.	Less than 50 lbs.
20 and heavier	3-30	30c.	34c.	36c.	38c.
	3-30	32c.	35c.	37c.	39c.
21 to 24 inclusive	30-48	33c.	37c.	39c.	41c.
	48-60	39c.	40c.	42c.	44c.
25 to 26	3-30	33c.	36c.	38c.	40c.
	30-48	35c.	38c.	40c.	42c.
27	3-30	36c.	37c.	39c.	41c.
	30-48	39c.	40c.	42c.	44c.
28	3-30	37c.	38c.	40c.	42c.
	30-48	40c.	41c.	43c.	45c.
29	3-30	38c.	39c.	41c.	43c.
	30-48	42c.	43c.	45c.	47c.
30	3-30	39c.	40c.	42c.	44c.

The above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheet. No charge for boxing. F. O. B. Mill.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.
Outside Diameters. BASE PRICE, 24 Cents per Pound.

Stubs' Gauge.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 in.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	26	23	..	..	13	19	9	8	15	22
12.	.109.	..	..	..	..	..	..	..	25	..	..	..	14	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	16	..	..	..	..	..
16.	.065.	..	..	..	..	..	27	26	26	23	22	20	20	20	20	26	30	36
18.	.049.	..	..	..	..	32	29	28	27	24	25	25	25	..	..	..	..	..
20.	.035.	116	..	45	38	33	32	31	29	28	29	29	29	30	37	48	57	80
21.	.032.	..	..	..	39	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.	137	97	47	41	37	36	34	33	..	..	44	..	..	..	..	..	..
24.	.022.	187	132	107	87	78	72	61	59	65	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Diameter. B. & S. G'ge	000 to No.	No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price per lb.	33	33½	33½	34	34½	35	35½	36	37	38	39	44	47	

BASE PRICE GRADE "B" GERMAN SILVER SHEET METAL.

Quality.	Net per lb.	Quality.	Net per lb.
5%	18¼c.	16%	22¾c.
8%	20c.	18%	23¼c.
10%	20½c.	20%	25½c.
12%	21½c.	25%	33¾c.
15%	22½c.	30%	39¾c.

GERMAN SILVER WIRE.

Quality.	Net per lb.	Quality.	Net per lb.
5%	19¼c.	15%	26½c.
8%	21c.	16%	27½c.
10%	22½c.	18%	29¼c.
12%	24½c.	30%	45¼c.

The above Base Prices are subject to additions for extras as per lists printed in Brass Manufacturers' Price List and from such extras 50% discount will be allowed. The above base prices and discounts are named only to wholesale buyers who purchase in good quantities. Prices on small lots are considerably higher.

PRICES OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from 1c. below to 4c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2½c. to 3½c. above the price of bullion.